



Washington Laboratories, Ltd.

**FCC Certification Test Report
For the
Airorlite Communications, Inc.
Model 50289 Bi-Directional Booster (Downlink)**

FCC ID: UT650289BA8800DL

**WLL JOB# 9520
February 19, 2007**

Prepared for:

**Airorlite Communications, Inc.
17-01 Pollitt Drive
Fair Lawn, NJ 07410**

Prepared By:

**Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879**

FCC Certification Test Report
for the
Airorlite Communications, Inc.
Model 50289 Bi-Directional Booster (Downlink)
FCC ID: UT650289BA8800DL

February 19, 2007

WLL JOB# 9520

Prepared by: Brian J. Dettling
Documentation Specialist

Reviewed by: Michael Violette
President

Abstract

This report has been prepared on behalf of Airorlite Communications, Inc. to support the attached Application for Equipment Authorization. The test report and application are submitted for a Licensed Transmitter under Part 90 of the FCC Rules. This Certification Test Report documents the test configuration and test results for a Airorlite Communications, Inc. Model 50289 Bi-Directional Booster (Downlink).

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The Airorlite Communications, Inc. Model 50289 Bi-Directional Booster (Downlink) complies with the limits for a Licensed Transmitter device under FCC Part 90.

Table of Contents

Abstract.....	ii
1 Introduction.....	1
1.1 Compliance Statement	1
1.2 Test Scope.....	1
1.3 Contract Information.....	1
1.4 Test Dates	1
1.5 Test and Support Personnel	1
1.6 Abbreviations.....	2
2 Equipment Under Test	3
2.1 EUT Identification & Description	3
2.2 Test Configuration	3
2.3 Testing Algorithm.....	4
2.4 Test Location	4
2.5 Measurements	4
2.5.1 References.....	4
2.6 Measurement Uncertainty.....	4
3 Test Equipment	5
4 Test Results	6
4.1 RF Power Output: (FCC Part §2.1046 & § 90.219)	6
4.2 Occupied Bandwidth: (FCC Part §2.1049).....	13
4.3 Bandwidth Rejection.....	19
4.4 Conducted Spurious Emissions at Antenna Terminals (FCC Part §2.1051)	23
4.5 Intermodulated Spurious Emissions	37
4.6 Radiated Spurious Emissions: (FCC Part §2.1053).....	45
4.6.1 Test Procedure	45
4.7 Conducted Emissions.....	49
4.7.1 Requirements	49
4.7.2 Test Procedure	49
4.7.3 Test Data	49
4.8 Frequency Stability: (FCC Part §2.1055)	51
4.9 Transient Frequency Response (Part 90.214).....	Error! Bookmark not defined.

List of Tables

Table 1. Device Summary.....	3
Table 2: Test Equipment List.....	5
Table 3. RF Power Output	6
Table 4. Antenna Specifications	6
Table 5. Occupied Bandwidth Results.....	19
Table 6. Conducted Spurious Emission Limits	Error! Bookmark not defined.
Table 7: Radiated Emission Frequency Data.....	45

Table 8: Radiated Emission Test Data, Low Channel	46
Table 9: Radiated Emission Test Data, Mid Channel.....	47
Table 10: Radiated Emission Test Data, High Channel	48
Table 11: Conducted Emission Test Data.....	50
Table 12. Frequency Deviation as a Function of Temperature.....	Error! Bookmark not defined.
Table 13. Frequency Deviation as a Function of Voltage	Error! Bookmark not defined.

List of Figures

Figure 1. Test Configuration.....	4
Figure 4-1. RF Peak Power, Low Channel, Carrier Wave.....	7
Figure 4-2. RF Peak Power, Low Channel, Frequency Modulation.....	8
Figure 4-3. RF Peak Power, Mid Channel, Carrier Wave	9
Figure 4-4. RF Peak Power, Mid Channel, Frequency Modulation	10
Figure 4-5. RF Peak Power, High Channel, Carrier Wave	11
Figure 4-6. RF Peak Power, High Channel, Frequency Modulation.....	12
Figure 4-7. Occupied Bandwidth, Low Channel	13
Figure 4-8. Occupied Bandwidth, Low Channel with Signal Generator Output.....	14
Figure 4-9. Occupied Bandwidth, Mid Channel.....	15
Figure 4-10. Occupied Bandwidth, Mid Channel with Signal Generator Output	16
Figure 4-11. Occupied Bandwidth, High Channel	17
Figure 4-12. Occupied Bandwidth, High Channel with Signal Generator Output	18
Figure 4-13. Bandwidth Rejection, Low Channel	20
Figure 4-14. Bandwidth Rejection, Mid Channel.....	21
Figure 4-15. Bandwidth Rejection, High Channel	22
Figure 4-16. Conducted Spurious Emissions, Low Channel Inband.....	23
Figure 4-17. Conducted Spurious Emissions, Low Channel 30 – 862MHz.....	24
Figure 4-18. Conducted Spurious Emissions, Low Channel 865 – 1000MHz.....	24
Figure 4-19. Conducted Spurious Emissions, Low Channel 1 – 2.5GHz	25
Figure 4-20. Conducted Spurious Emissions, Low Channel 2.5 – 9GHz	26
Figure 4-21. Conducted Spurious Emissions, Mid Channel Inband.....	27
Figure 4-22. Conducted Spurious Emissions, Mid Channel 30 – 867MHz	28
Figure 4-23. Conducted Spurious Emissions, Mid Channel 867 – 1000MHz	29
Figure 4-24. Conducted Spurious Emissions, Mid Channel 1 – 2.5GHz	30
Figure 4-25. Conducted Spurious Emissions, Mid Channel 2.5 – 9GHz	31
Figure 4-26. Conducted Spurious Emissions, High Channel Inband	32
Figure 4-27. Conducted Spurious Emissions, High Channel 30 – 869MHz	33
Figure 4-28. Conducted Spurious Emissions, High Channel 870 – 1000MHz	34
Figure 4-29. Conducted Spurious Emissions, High Channel 1 – 2.5GHz.....	35
Figure 4-30. Conducted Spurious Emissions, High Channel 2.5 – 9GHz.....	36
Figure 4-31. Intermodulated Spurious Emissions, In-band, Input.....	37
Figure 4-32. Intermodulated Spurious Emissions, In-band, Output	38
Figure 4-33. Intermodulated Spurious Emissions, In-band, 863.5 – 866.5MHz	39

Figure 4-34. Intermodulated Spurious Emissions, In-band, 866.5 – 869.1MHz 40

Figure 4-35. Intermodulated Spurious Emissions, 30 – 865MHz 41

Figure 4-36. Intermodulated Spurious Emissions, 869 – 1000MHz 42

Figure 4-37. Intermodulated Spurious Emissions, 1 – 2.5GHz 43

Figure 4-38. Intermodulated Spurious Emissions, 2.5 – 9GHz 44

1 Introduction

1.1 Compliance Statement

The Airorlite Communications, Inc. Model 50289 Bi-Directional Booster (Downlink) complies with the limits for a Licensed Transmitter device under FCC Part 90.

1.2 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with FCC Public Notice DA 00-705 and the 2003 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer:	Airorlite Communications, Inc. 17-01 Pollitt Drive Fair Lawn, NJ 07410
Purchase Order Number:	001700
Quotation Number:	63230

1.4 Test Dates

Testing was performed on the following date(s): December 21, 2006 to January 11, 2007

1.5 Test and Support Personnel

Washington Laboratories, LTD	Steve Dovell, Adam Black
Client Representative	Lee Masoian, Rick Kieselowsky

1.6 Abbreviations

A	A mpere
ac	a lternating current
AM	A mplitude Modulation
Amps	A mperes
b/s	b its per second
BW	B and W idth
CE	C onducted E mission
cm	c entimeter
CW	C ontinuous W ave
dB	d eci B el
dc	d irect current
EMI	E lectromagnetic I nterference
EUT	E quipment U nder T est
FM	F requency M odulation
G	g iga - prefix for 10^9 multiplier
Hz	H ertz
IF	I ntermediate F requency
k	k ilo - prefix for 10^3 multiplier
LISN	L ine I mpedance S tabilization N etwork
M	M ega - prefix for 10^6 multiplier
m	m eter
μ	m icro - prefix for 10^{-6} multiplier
NB	N arrow b and
QP	Q uasi- P eak
RE	R adiated E missions
RF	R adio F requency
rms	r oot- m ean-square
SN	S erial N umber
S/A	S pectrum A nalyzer
V	V olt

2 Equipment Under Test

2.1 EUT Identification & Description

The Airorlite Communications, Inc. Model 50289 Bi-Directional Booster is an eight channel bi-directional amplifier utilizing 16 channels of synchronized down-up conversions.

The multi-channel booster is divided into two independent 8 channel systems (8 high bands and 8 low bands) for full duplex operations. Downlink signals are received at the roof antenna, 8 selected frequencies are processed (filtering and amplification), and rebroadcast on radiating cable. Conversely, uplink signals induced onto radiating cable are similarly processed and rebroadcast on the roof antenna. The downlink channels are the high band signals (864-869 MHz), and the 8 uplink channels are low band (819-824 MHz).

Each system consisting of a LNA/8-way splitter, 8 channel modules (down-up converters with synthesized LO), 8-way combiner, and RF power amplifiers with an 8-way power combiner. In addition a duplexer combines the uplink RF output and downlink RF input to a common “Off the Air” antenna.

The RF signal flow of the two systems is identical. RF band pass filters internal to the system modules determine high band or low band operations.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Airorlite Communications, Inc.
FCC ID:	UT650289BA8800DL
Model:	Model 50289 Bi-Directional Booster (Downlink)
FCC Rule Parts:	§90
Frequency Range:	864 - 869MHz
Maximum Output Power:	181mW (22.6dBm)
Antenna Gain (dBd)	5.0
Modulation:	Depends on system
Necessary Bandwidth:	N/A
Keying:	N/A
Type of Information:	Depends on system
Number of Channels:	8
Power Output Level	Fixed
Antenna Connector	N-type
Frequency Tolerance:	N/A
Emission Type(s):	F1E
Interface Cables:	N/A
Power Source & Voltage:	120Vac

2.2 Test Configuration

The Model 50289 Bi-Directional Booster (Downlink) was configured with the Uplink unit and a signal generator. See diagram below.

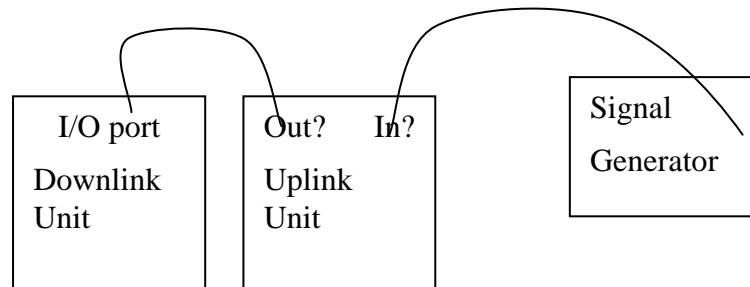


Figure 1. Test Configuration.

2.3 Testing Algorithm

A signal Generator was setup and used to send an RF signal into the RF input port on the unit under test. Worst case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

2.5 Measurements

2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (ANSI/TIA/EIA-603-93)

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ± 2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5 (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

Table 2: Test Equipment List

Site 1 List:

WLL Asset #	Manufacturer Model/Type	Function	Cal. Due
00070	HP, 85685A	Preselector, RF w/opt 8ZE	07/03/2007
00074	HP, 8593A	Analyzer, Spectrum	10/13/2007
00066	HP, 8449B	Pre-Amplifier, RF. 1-26.5GHz	06/22/2007
00001	A.H., Systems, SAS-200/518	Antenna, LP, 1-18GHz	03/11/2007
00004	ARA, DRG-118/A	Antenna, DRG, 1-18GHz	02/02/2007
00028	EMCO, 3146	Antenna, Log Periodic	09/15/2008
00382	Sunol, JB1	Antenna, Biconlog	01/25/2007
00068	HP, 85650A	Adapter, QP	07/03/2007
00072	HP, 8568B	Analyzer, Spectrum	07/03/2007

4 Test Results

4.1 RF Power Output: (FCC Part §2.1046 & § 90.219)

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer. The analyzer offset was adjusted to compensate for the attenuator and other losses in the system.

Table 3. RF Power Output

Frequency	Level	Antenna Gain	ERP W	Limit § 90.219	Pass/Fail
Low Channel 864.013MHz	22.2 dBm	5.0 dBi	0.525	5 W ERP	Pass
Mid Channel 866.5MHz	22.6 dBm	5.0 dBi	0.575	5 W ERP	Pass
High Channel 868.988MHz	22.6 dBm	5.0 dBi	0.575	5 W ERP	Pass

Table 4. Antenna Specifications

Item: 473442 des: 806-2300 MicroFill, Outdoor

Parameter	Specification
Specific Freq. (MHz)	806-960/1710-2300
Bandwidth @ Rated VSWR (MHz)	154/590 MHz
Polarization	Vertical
Bending Moment (ft lbs)	Not Specified
Connector (direct)	N Female
Connector Placement	Bottom
Downtilt (deg)	None
Front to Back Ratio (dB)	Not Specified
Gain (dBd)	4.5/5.0
Gain(dBi)	6.6/7.1
General Freq. (MHz)	806-960/1710-2300
H. Beamwidth	70 Deg.
Incl. Hardware	Fits 4 Holes In Backplate
Intermodulation	Not Specified
Jumper Included	None
Lateral Thrust @ RWV (lbs)	Not Specified
Lightning Prot.	DC Ground
Maximum Power Input (Watts)	75
Mount Hdw. Incl.	Light Duty Outdoor Wall

Vertical Beamwidth

50 Deg

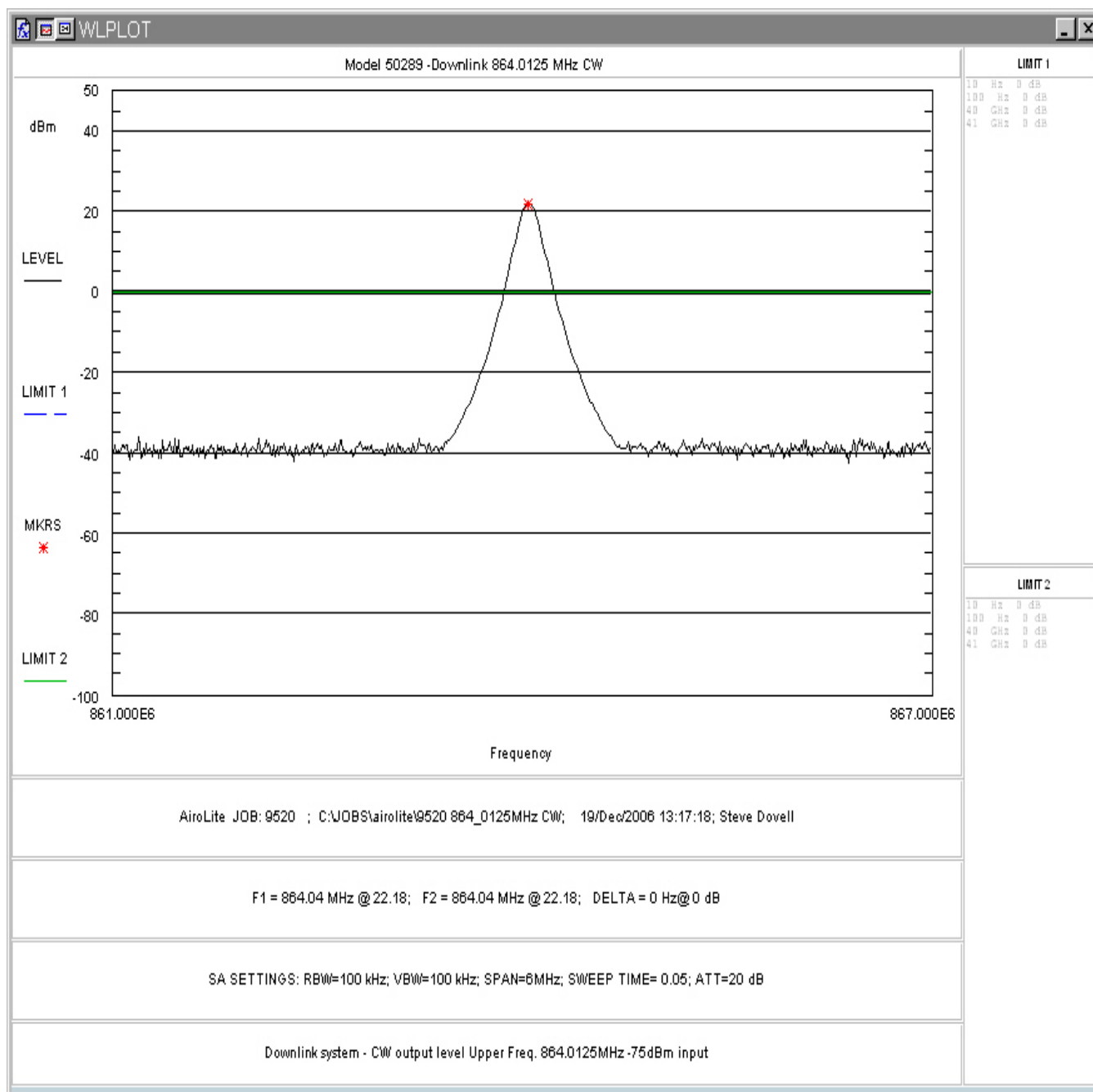


Figure 4-1. RF Peak Power, Low Channel, Carrier Wave

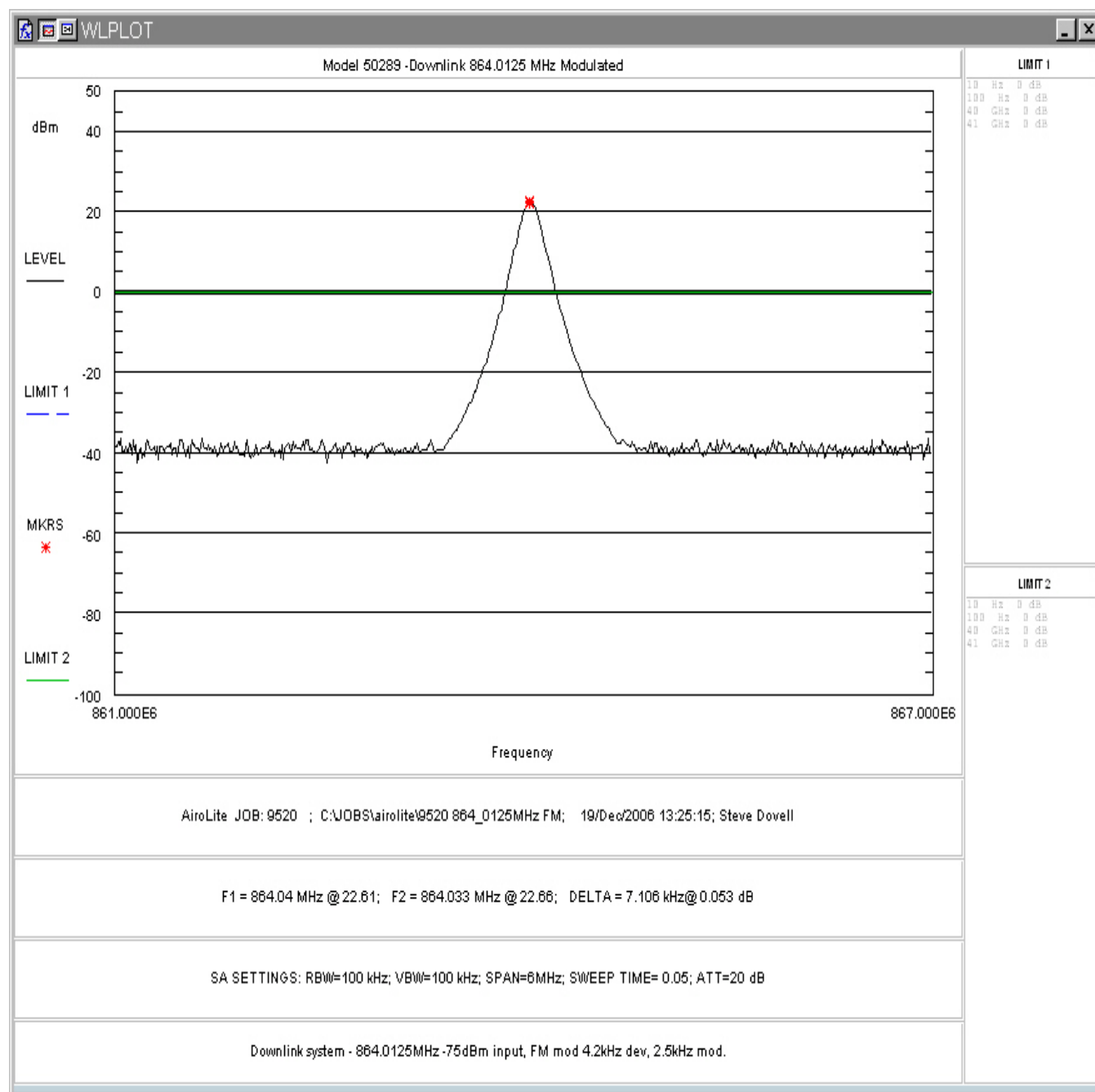


Figure 4-2. RF Peak Power, Low Channel, Frequency Modulation

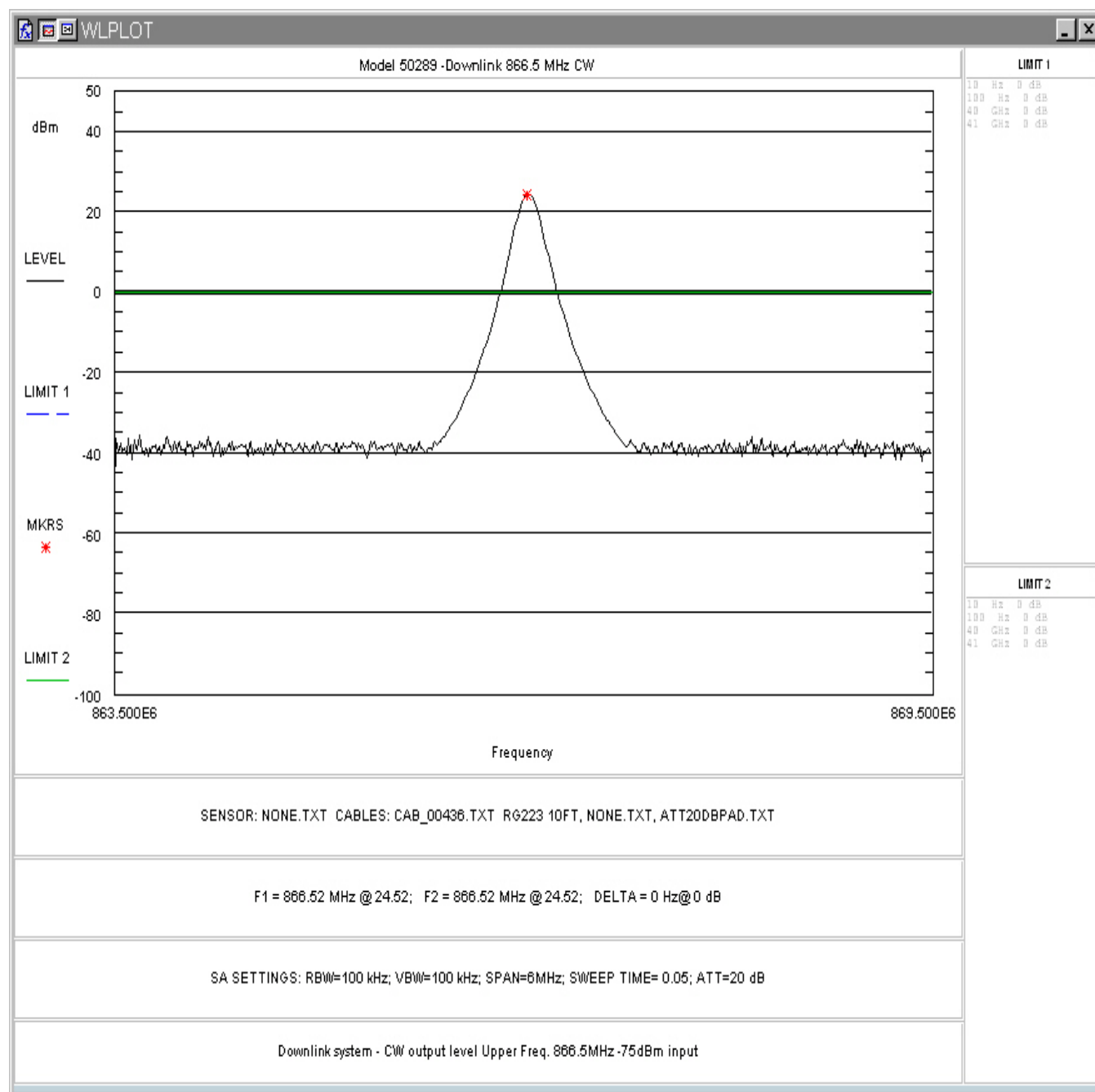


Figure 4-3. RF Peak Power, Mid Channel, Carrier Wave

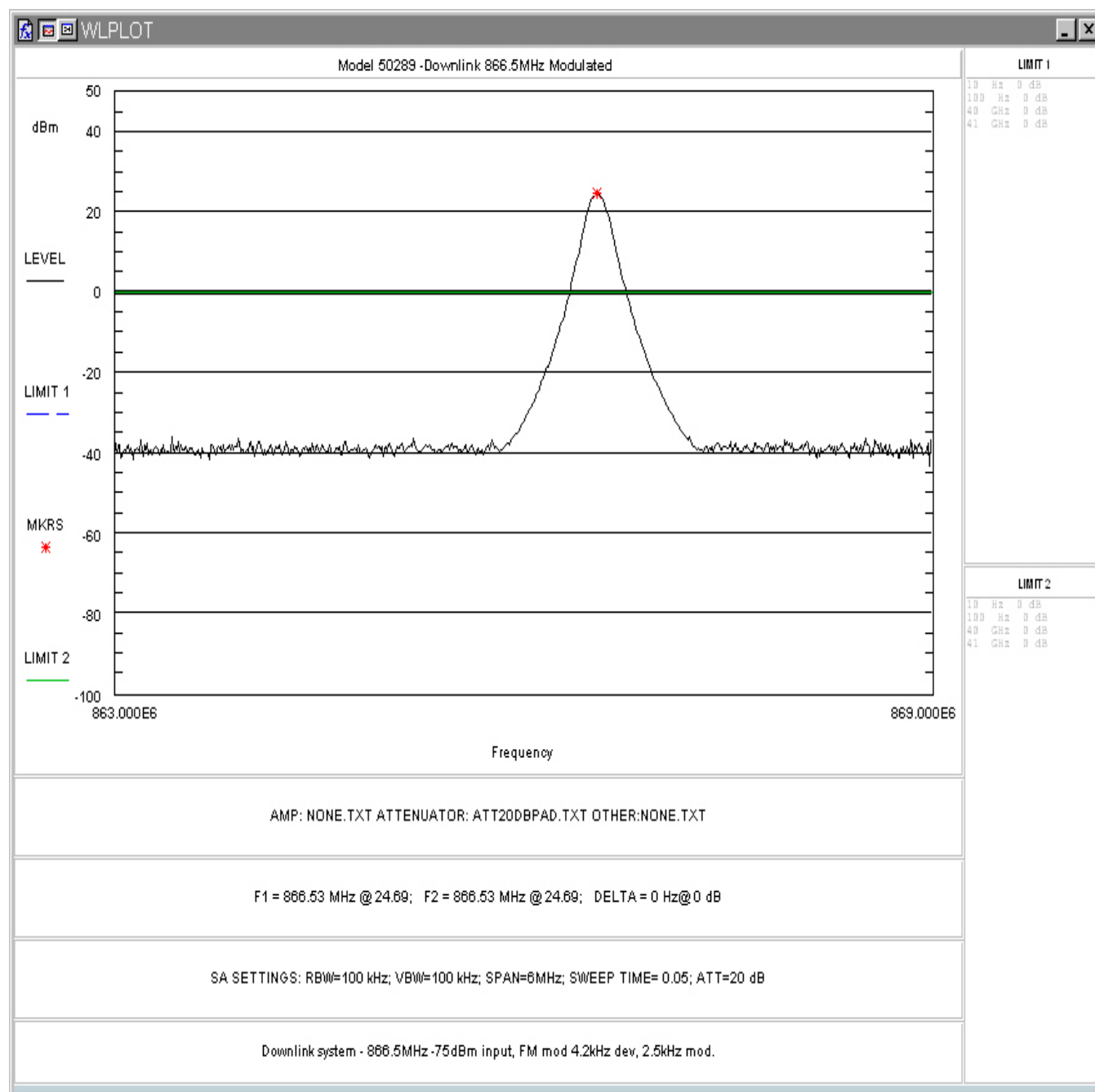


Figure 4-4. RF Peak Power, Mid Channel, Frequency Modulation

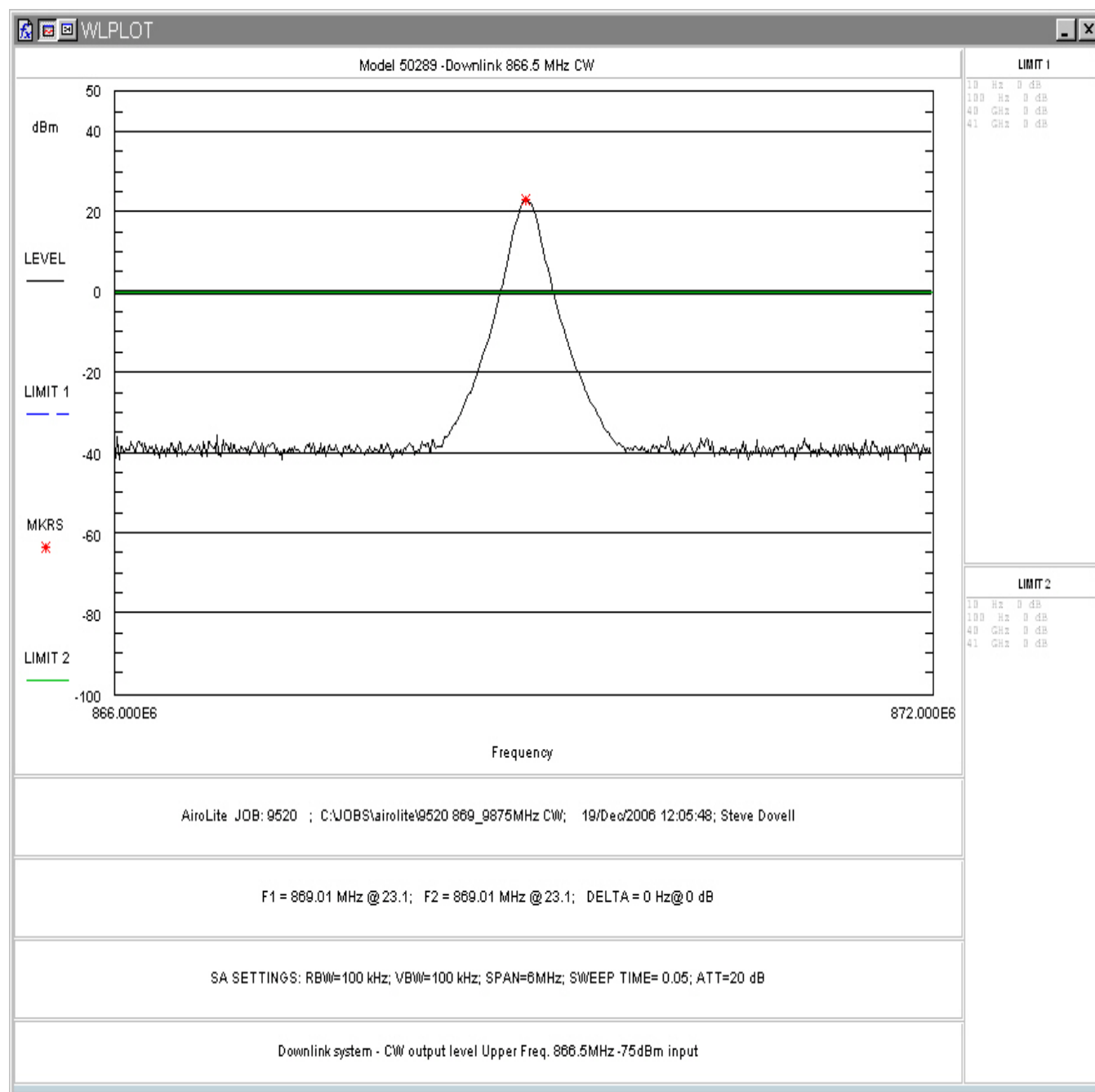


Figure 4-5. RF Peak Power, High Channel, Carrier Wave

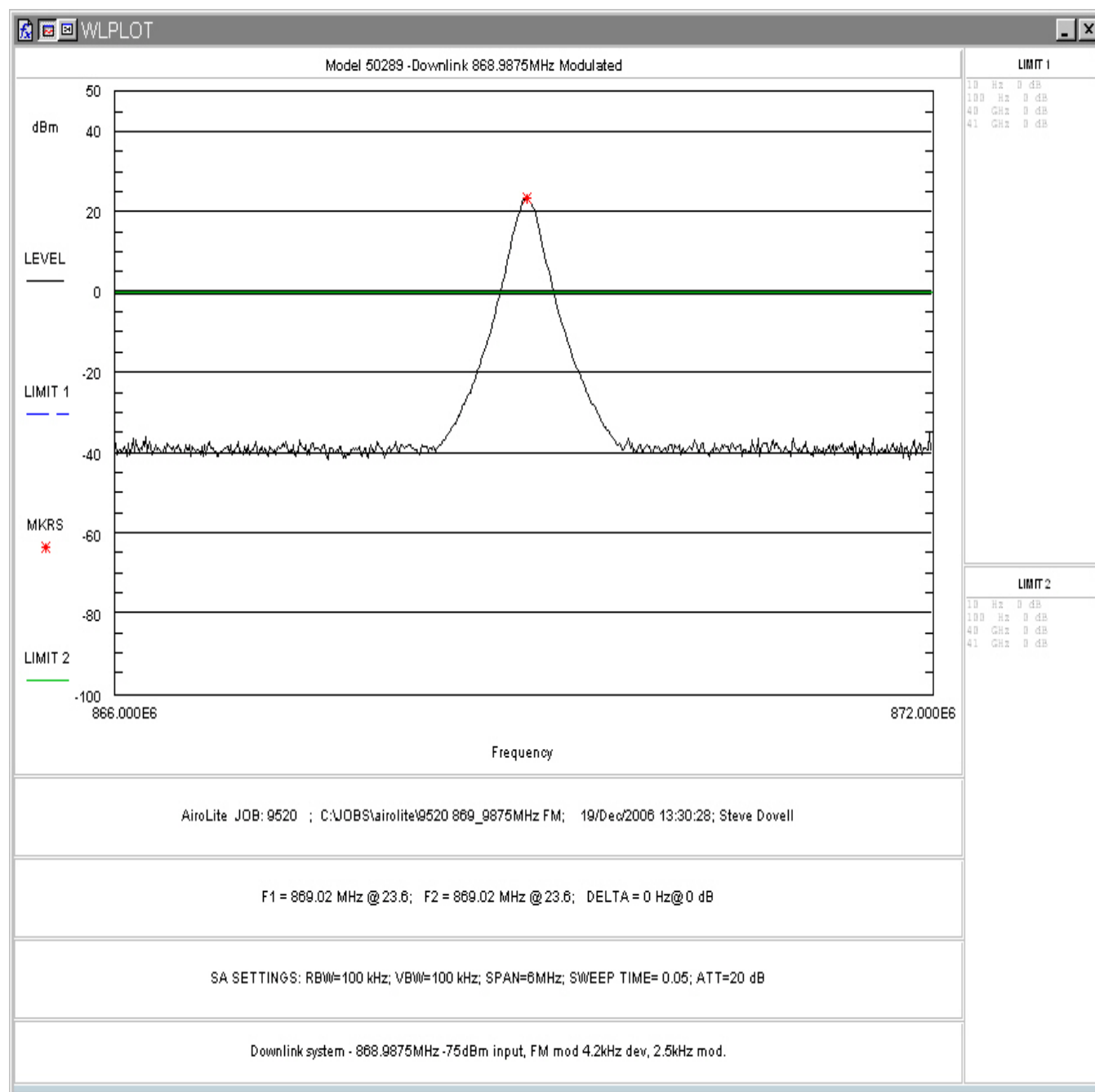


Figure 4-6. RF Peak Power, High Channel, Frequency Modulation

4.2 Occupied Bandwidth: (FCC Part §2.1049)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

At full modulation, the occupied bandwidth was measured as shown:

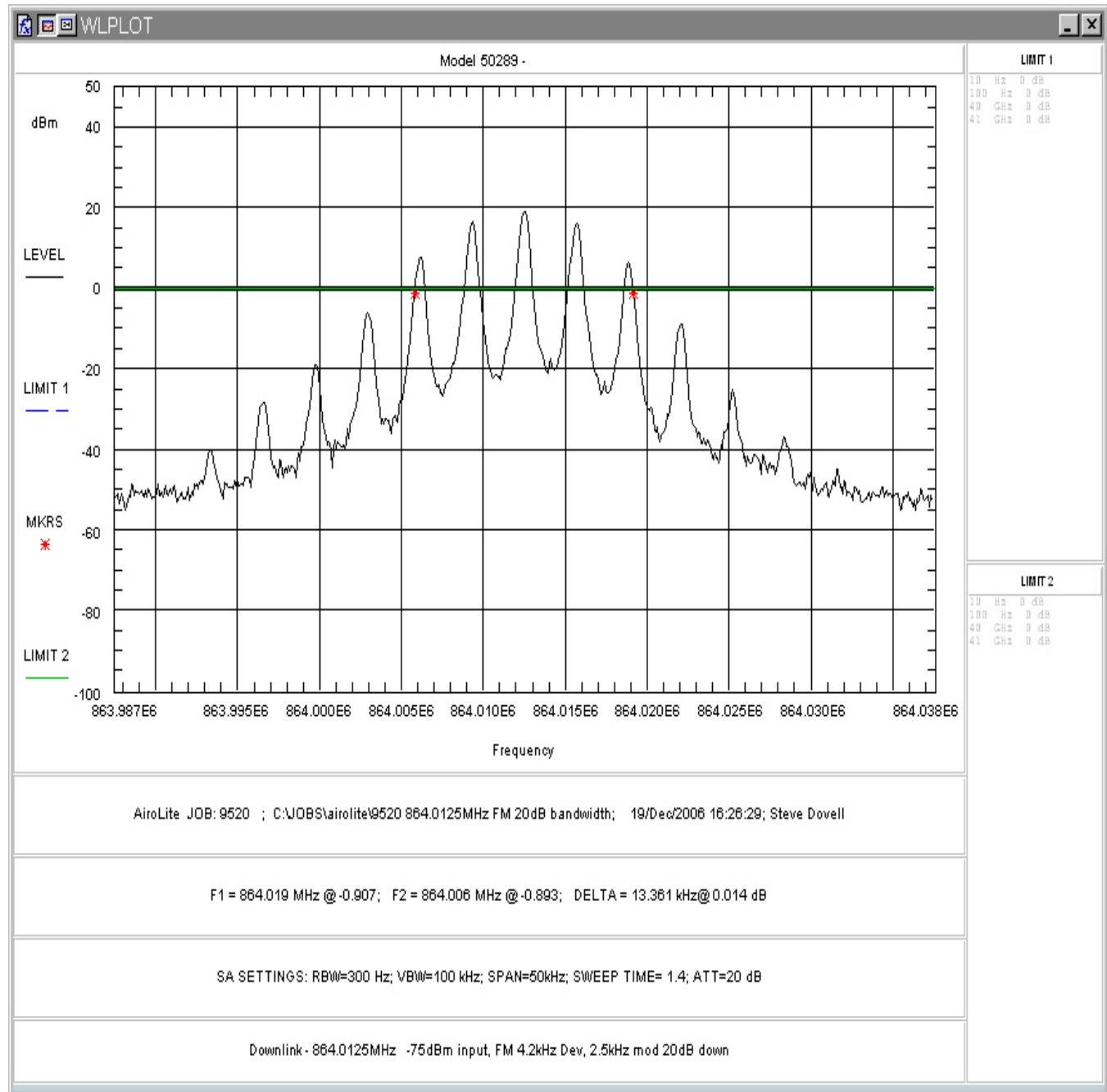


Figure 4-7. Occupied Bandwidth, Low Channel

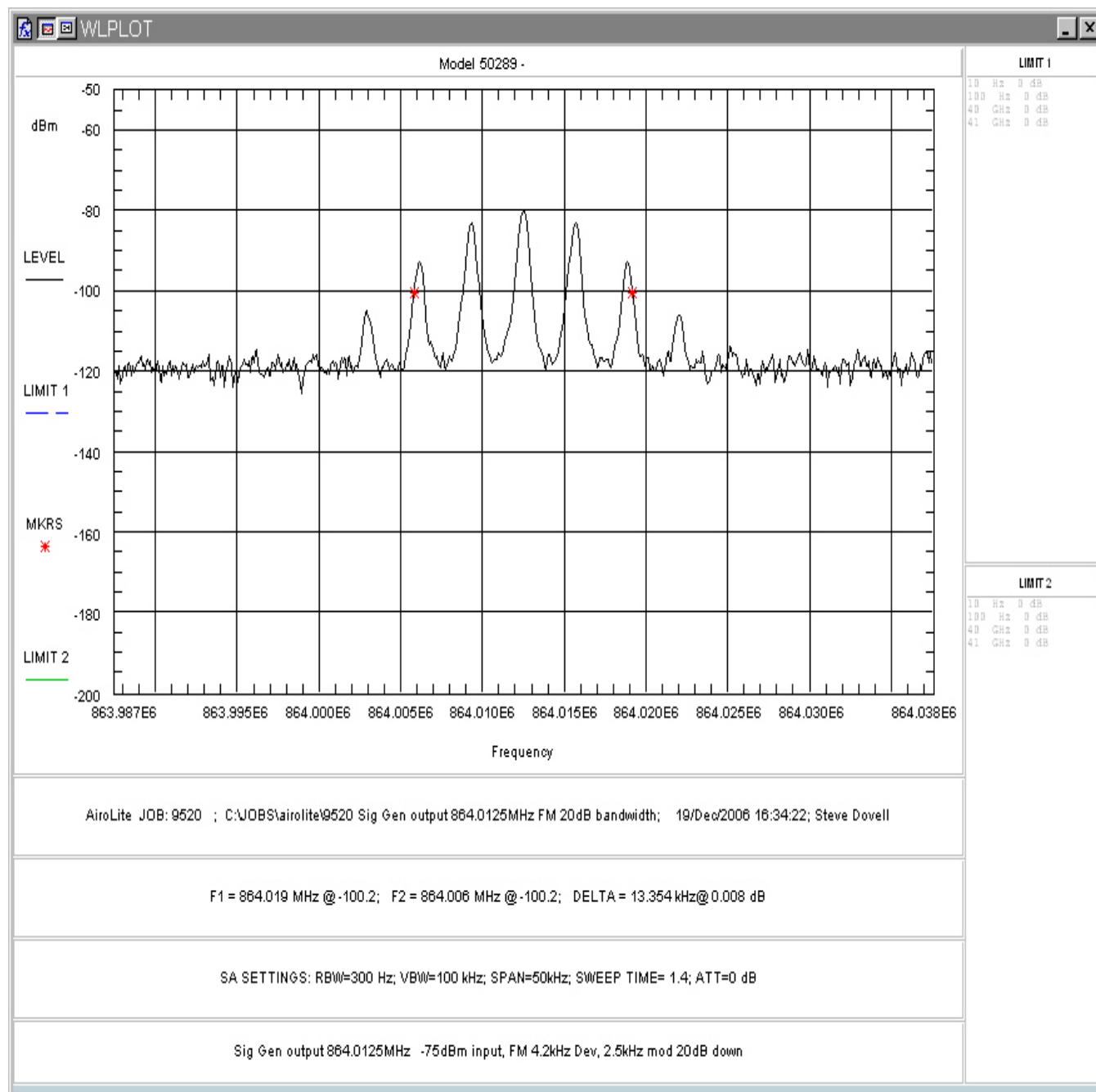


Figure 4-8. Occupied Bandwidth, Low Channel with Signal Generator Output

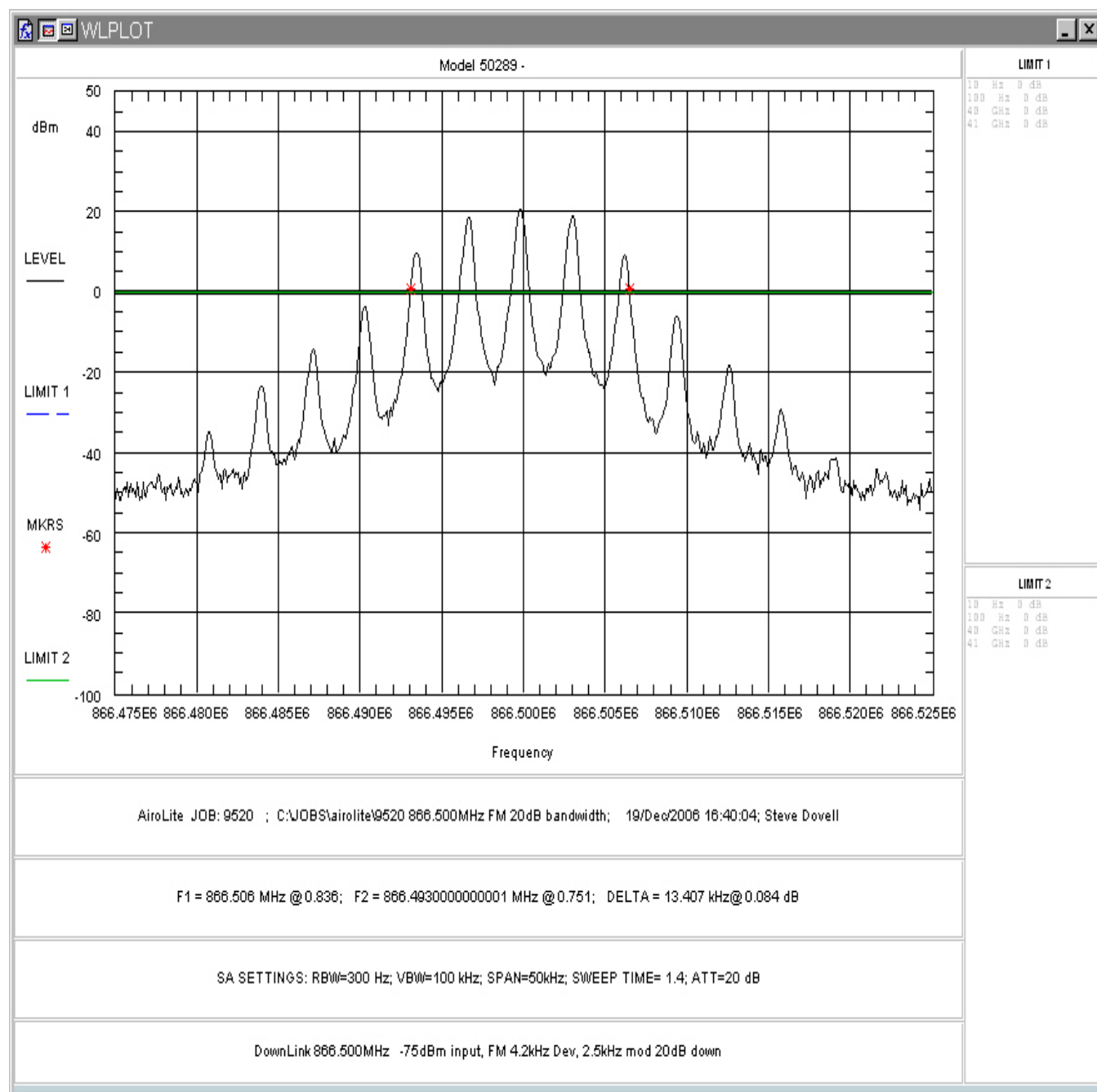


Figure 4-9. Occupied Bandwidth, Mid Channel

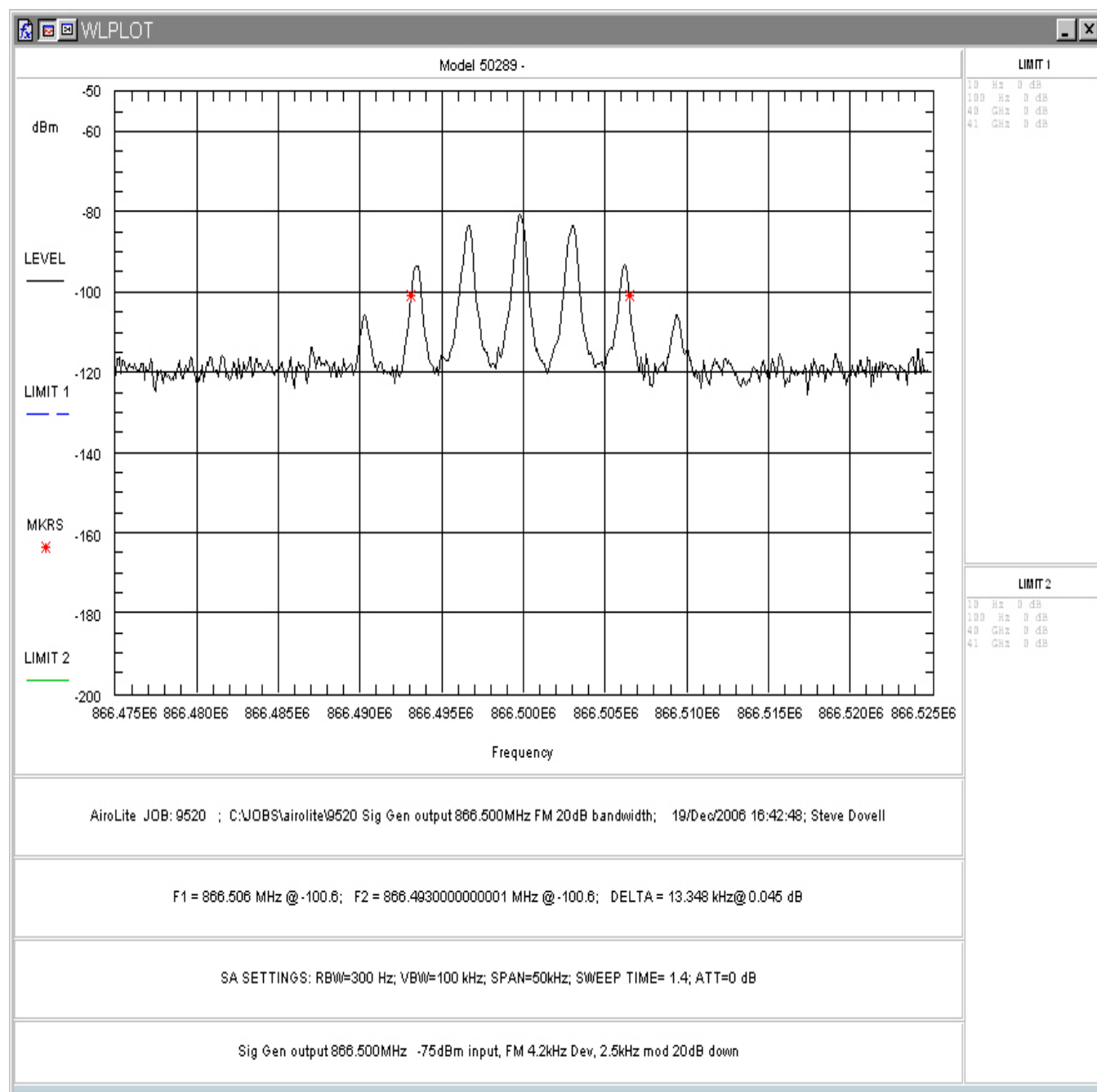


Figure 4-10. Occupied Bandwidth, Mid Channel with Signal Generator Output

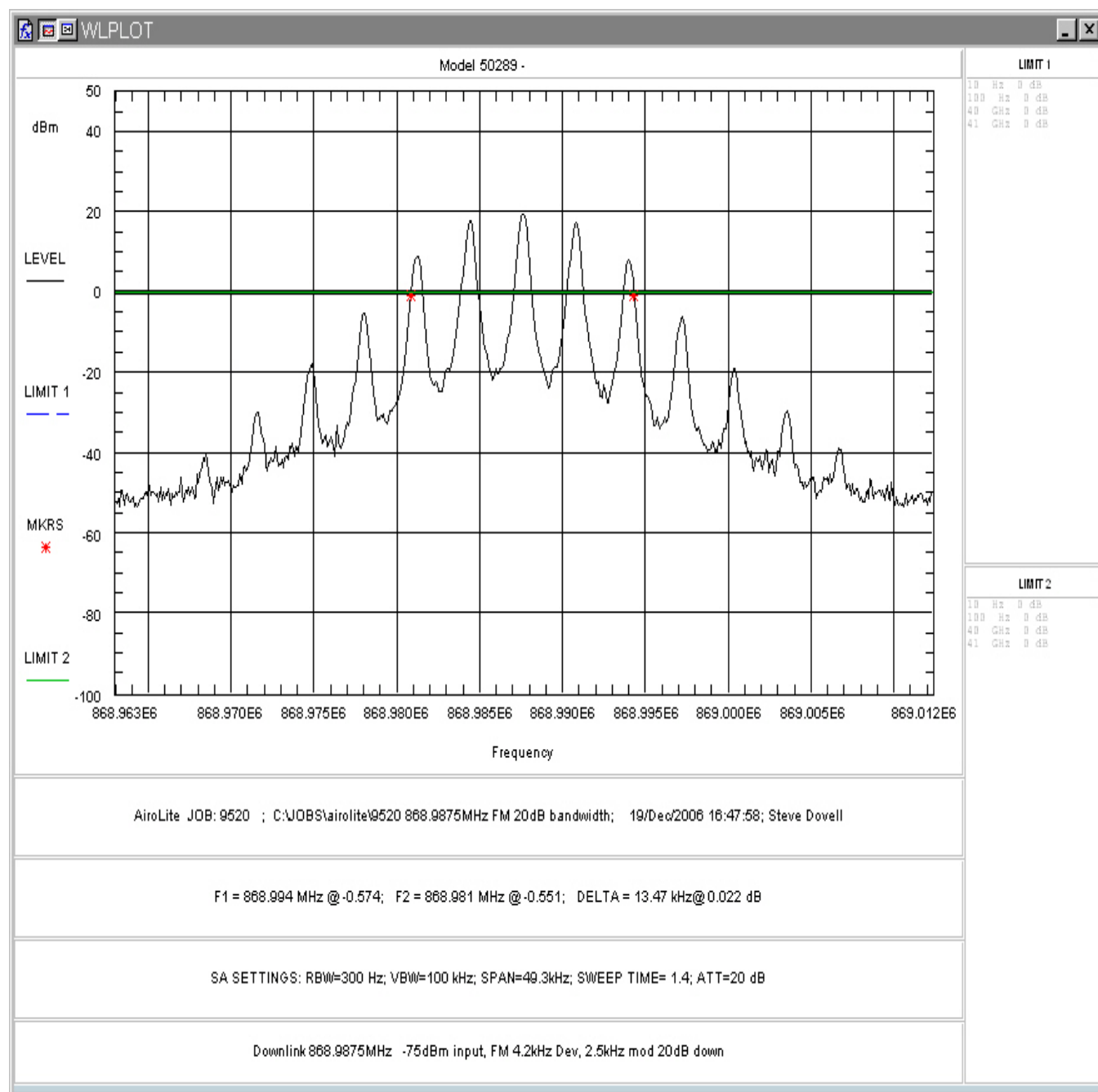


Figure 4-11. Occupied Bandwidth, High Channel

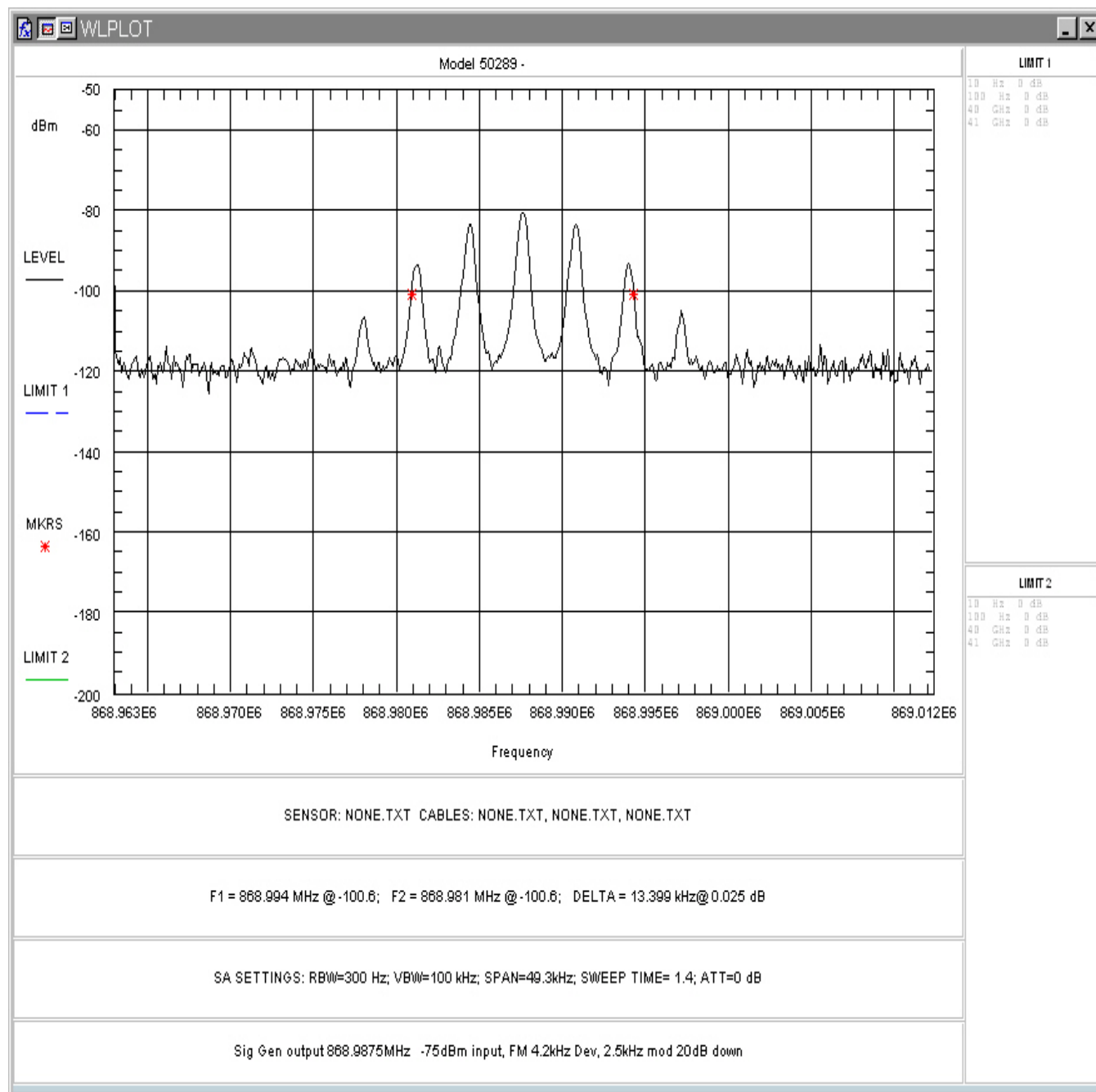


Figure 4-12. Occupied Bandwidth, High Channel with Signal Generator Output

Table 5 provides a summary of the Occupied Bandwidth Results.

Table 5. Occupied Bandwidth Results

Frequency	Bandwidth	Limit	Pass/Fail
Low Channel: 864.013MHz	13.361kHz	1 MHz	Pass
with Signal Generator Output 864.013MHz	13.354kHz		Pass
Mid Channel 866.5MHz	13.407kHz	1 MHz	Pass
with Signal Generator Output 866.5MHz	13.348kHz		Pass
High Channel 868.988MHz	13.47kHz	1 MHz	Pass
with Signal Generator Output 868.988MHz	13.399kHz		Pass

4.3 Bandwidth Rejection

Bandwidth Rejection was performed by sweeping from below through the channel band with SA on Max hold. The client attests that maximum input for the uplink should be -60dBm.

The Bandwidth Rejection was measured as shown:

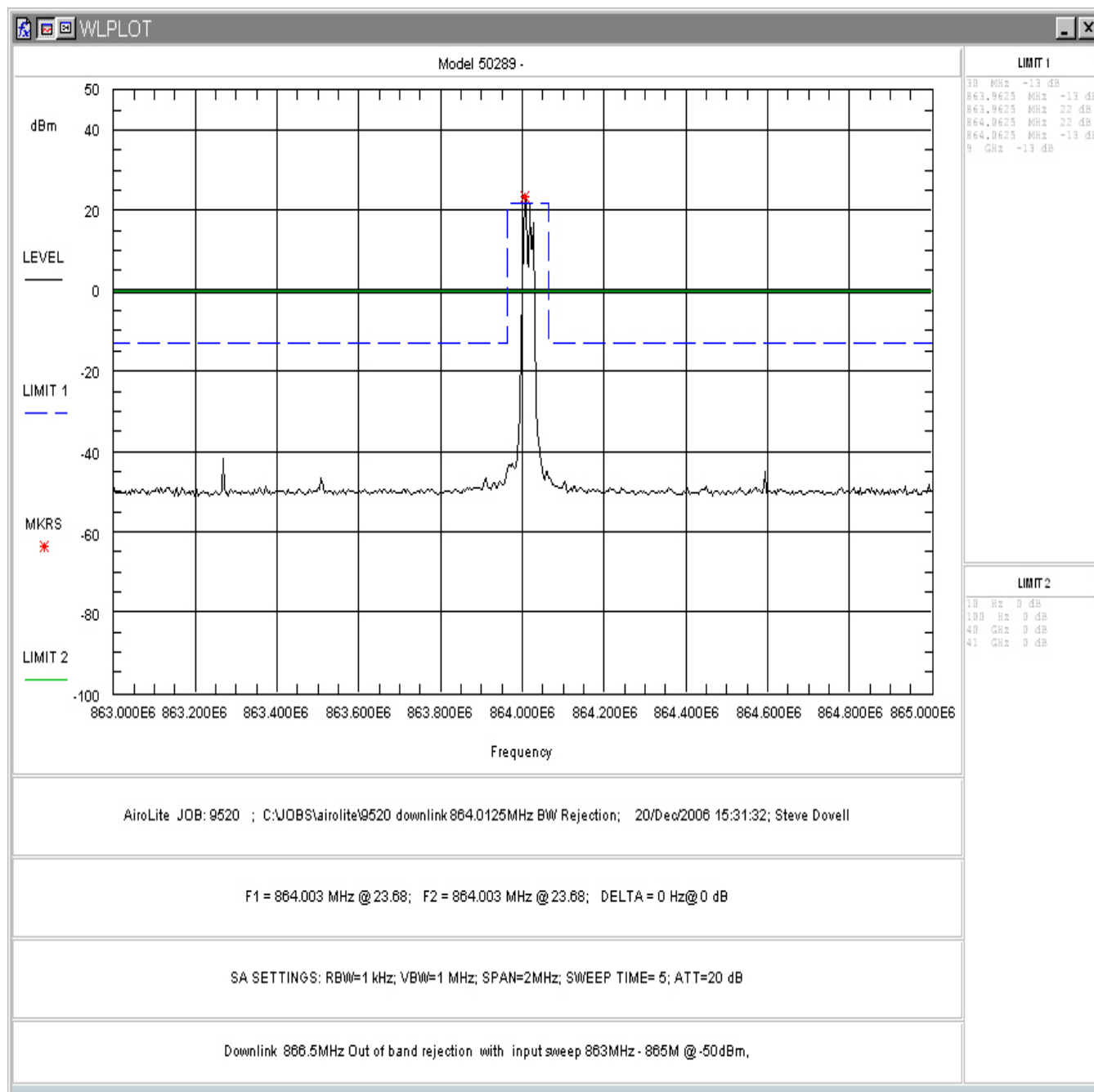


Figure 4-13. Bandwidth Rejection, Low Channel

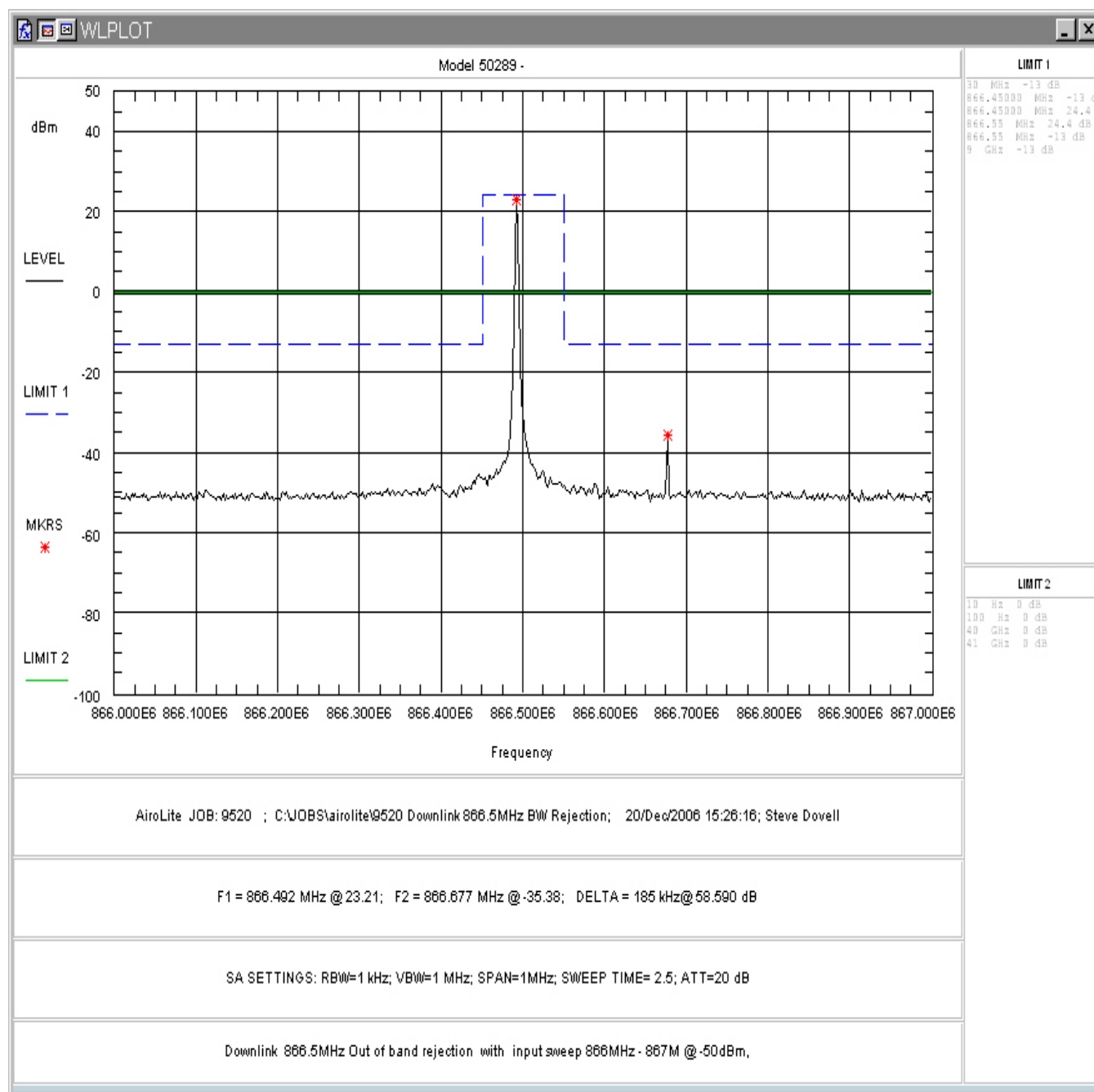


Figure 4-14. Bandwidth Rejection, Mid Channel

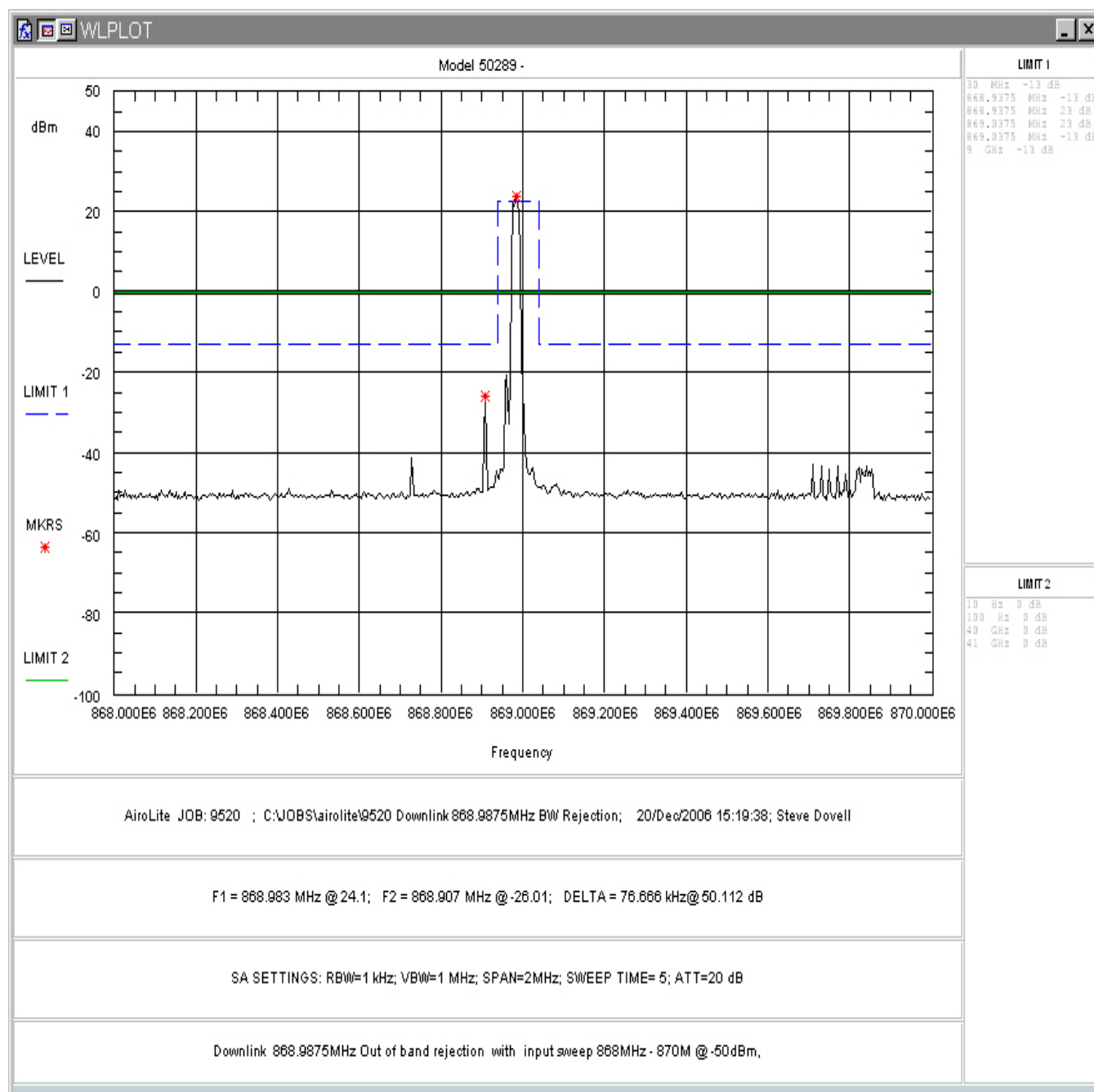


Figure 4-15. Bandwidth Rejection, High Channel

4.4 Conducted Spurious Emissions at Antenna Terminals (FCC Part §2.1051)

The following are plots of the conducted spurious emissions data.

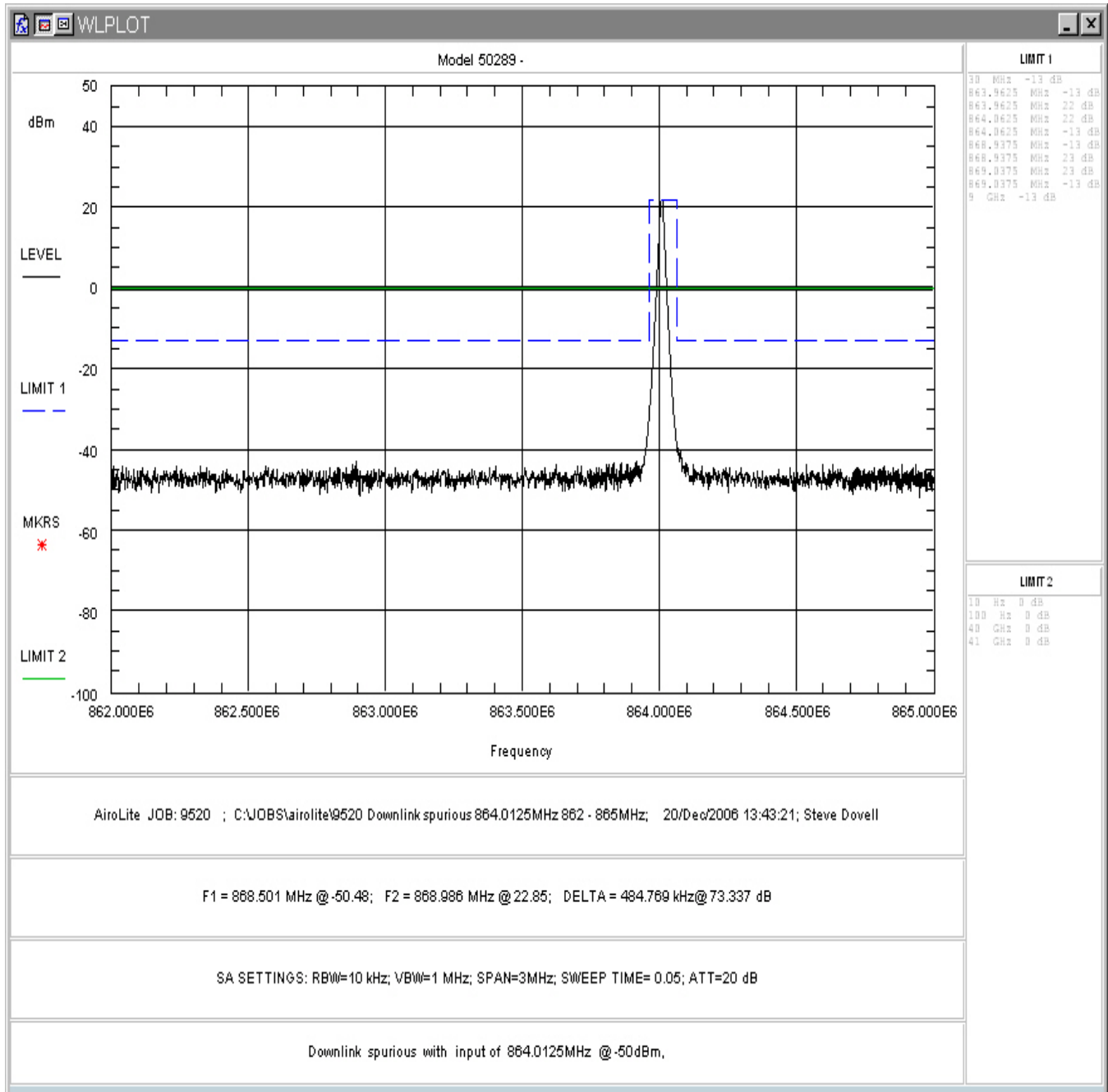


Figure 4-16. Conducted Spurious Emissions, Low Channel Inband

Data are not available; however emissions results will be similar to Figure 4-22 and Figure 4-27.

Figure 4-17. Conducted Spurious Emissions, Low Channel 30 – 862MHz

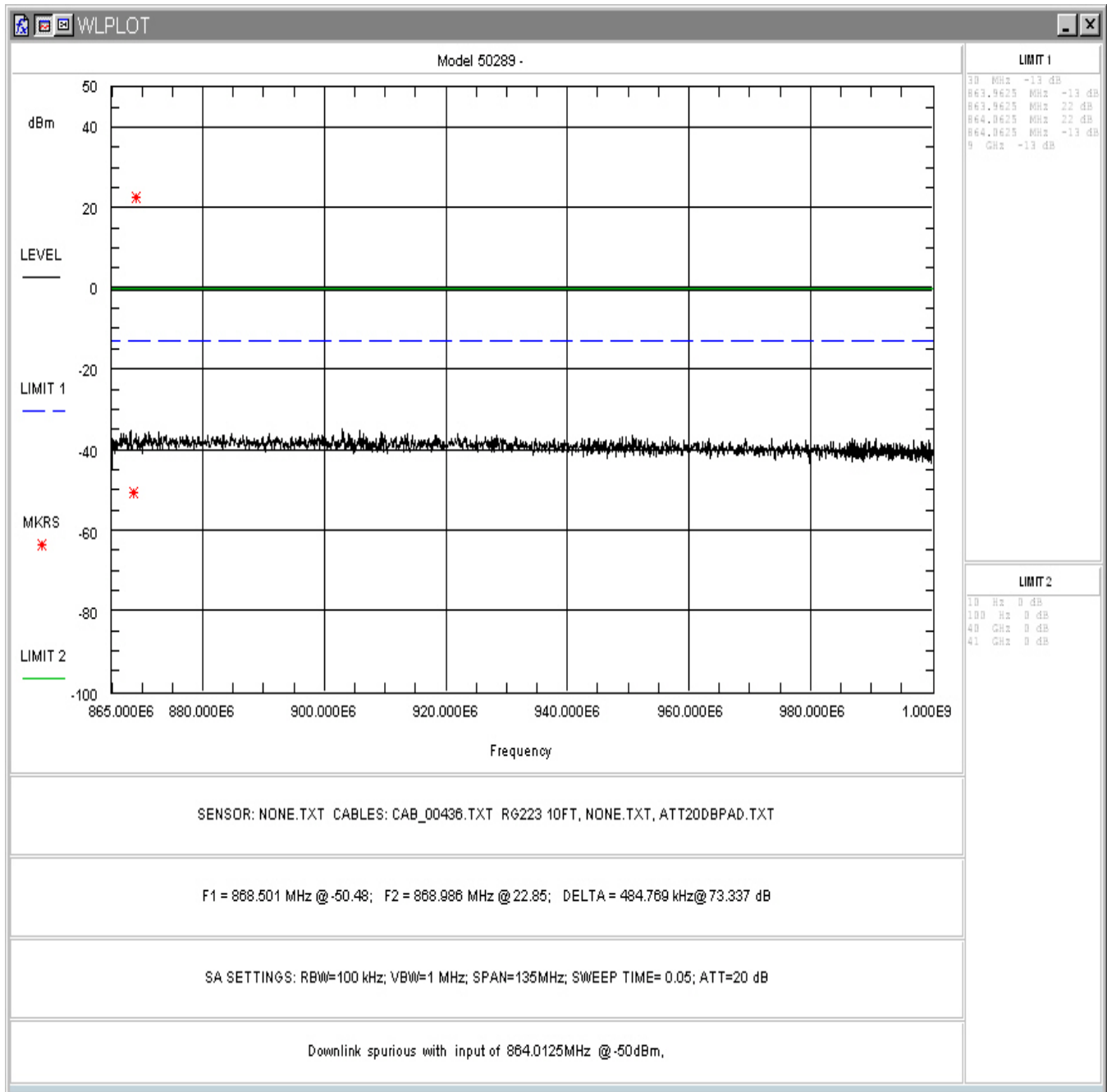


Figure 4-18. Conducted Spurious Emissions, Low Channel 865 – 1000MHz

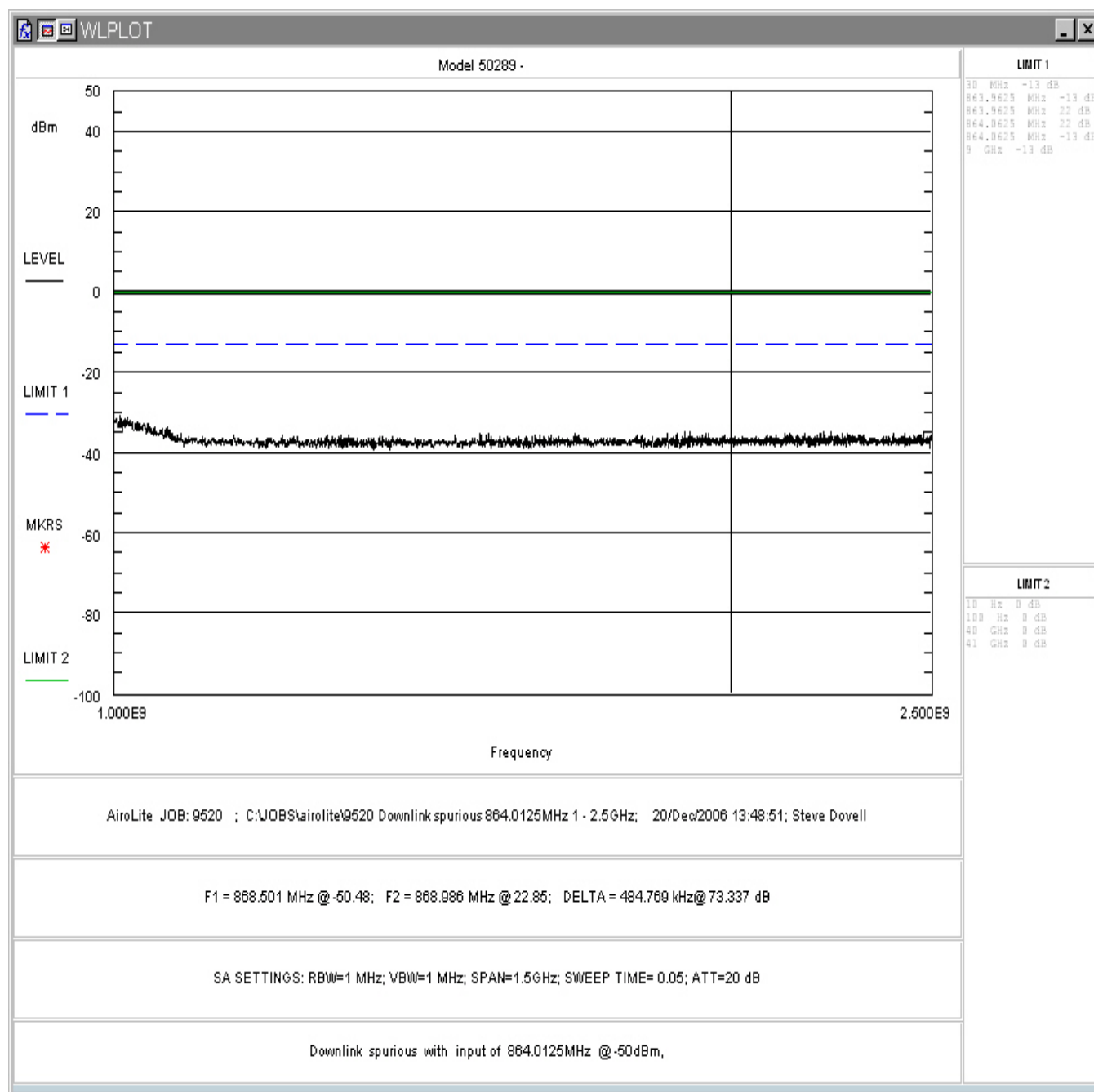


Figure 4-19. Conducted Spurious Emissions, Low Channel 1 – 2.5GHz

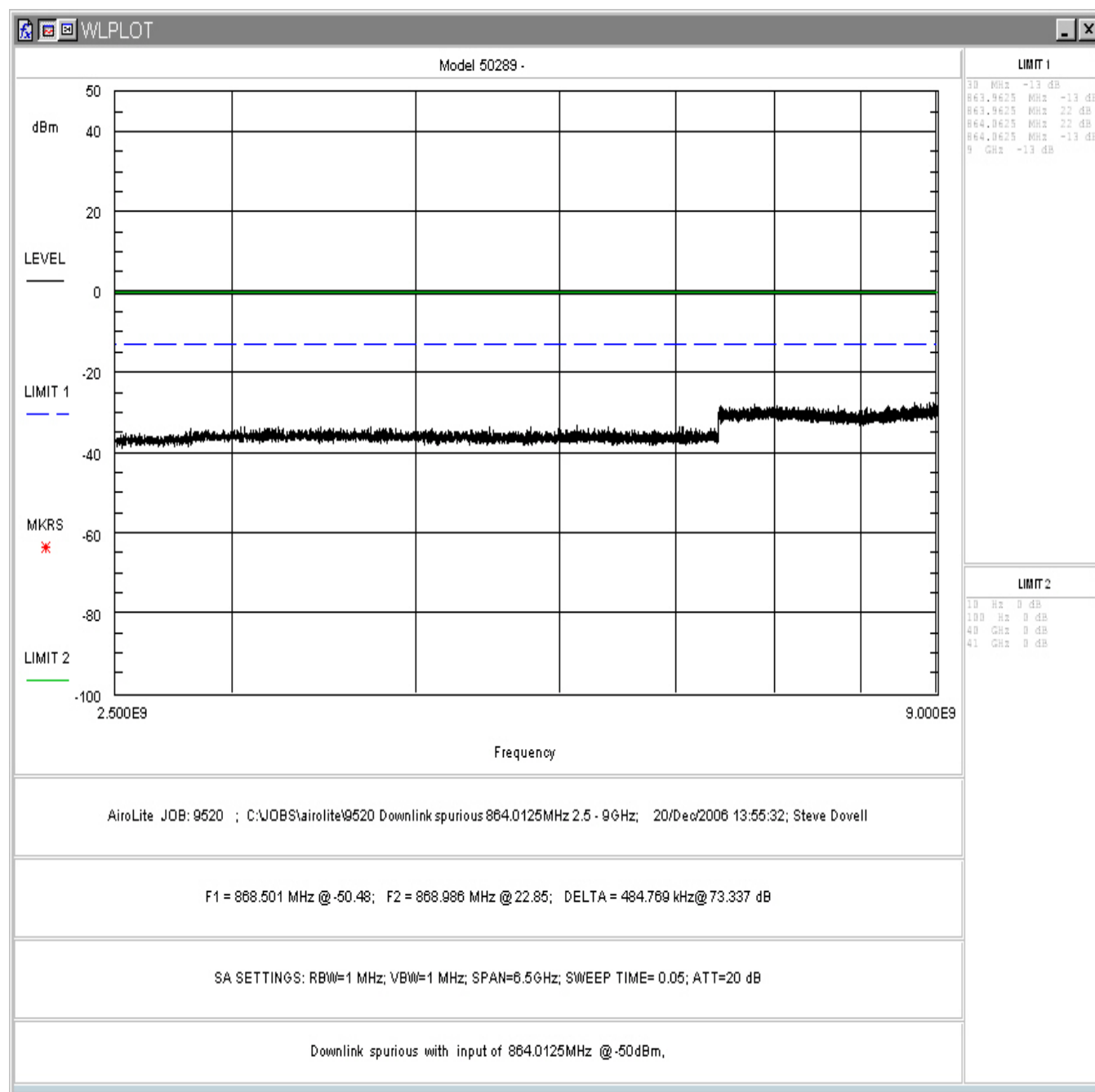


Figure 4-20. Conducted Spurious Emissions, Low Channel 2.5 – 9GHz

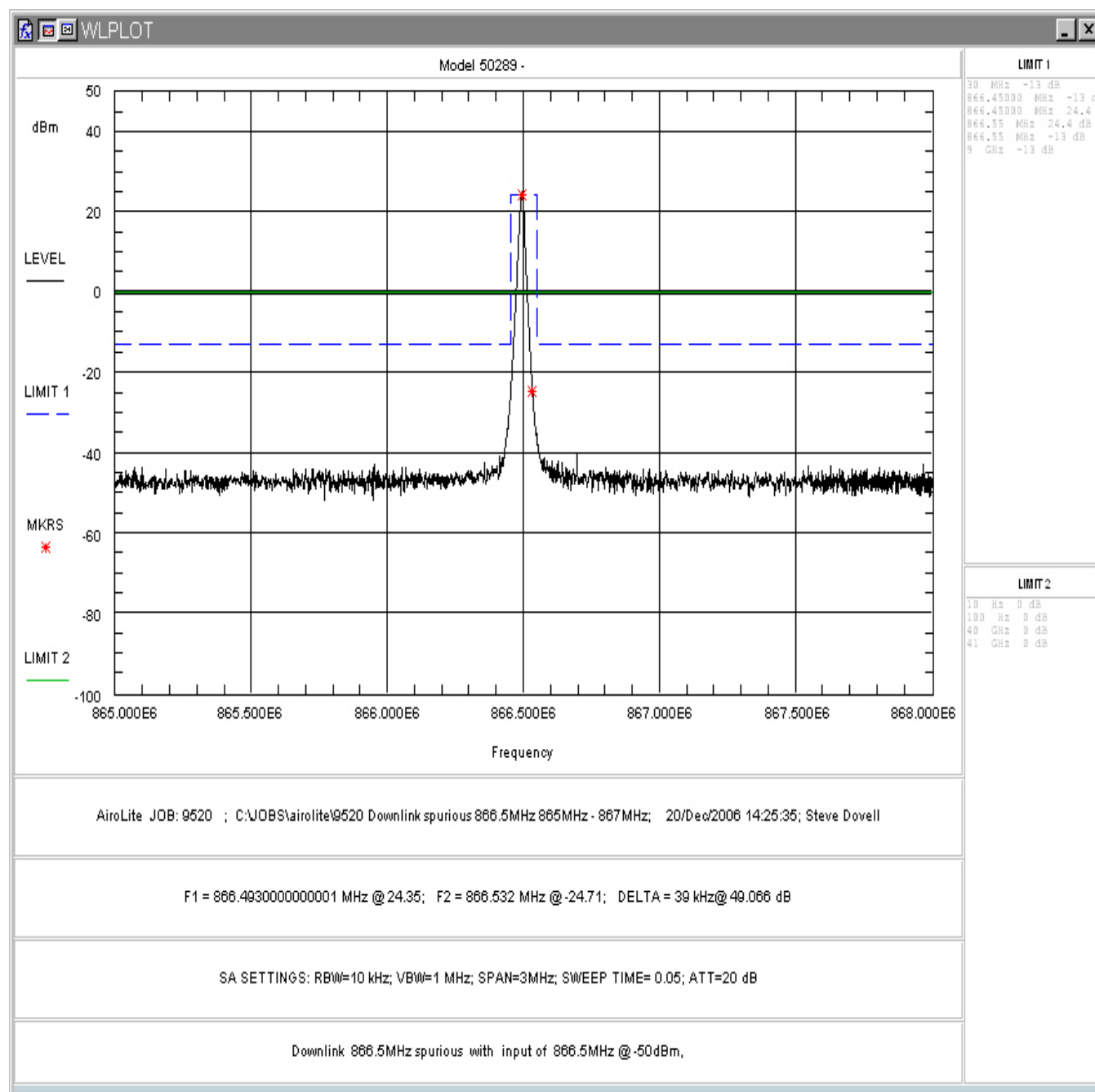


Figure 4-21. Conducted Spurious Emissions, Mid Channel Inband

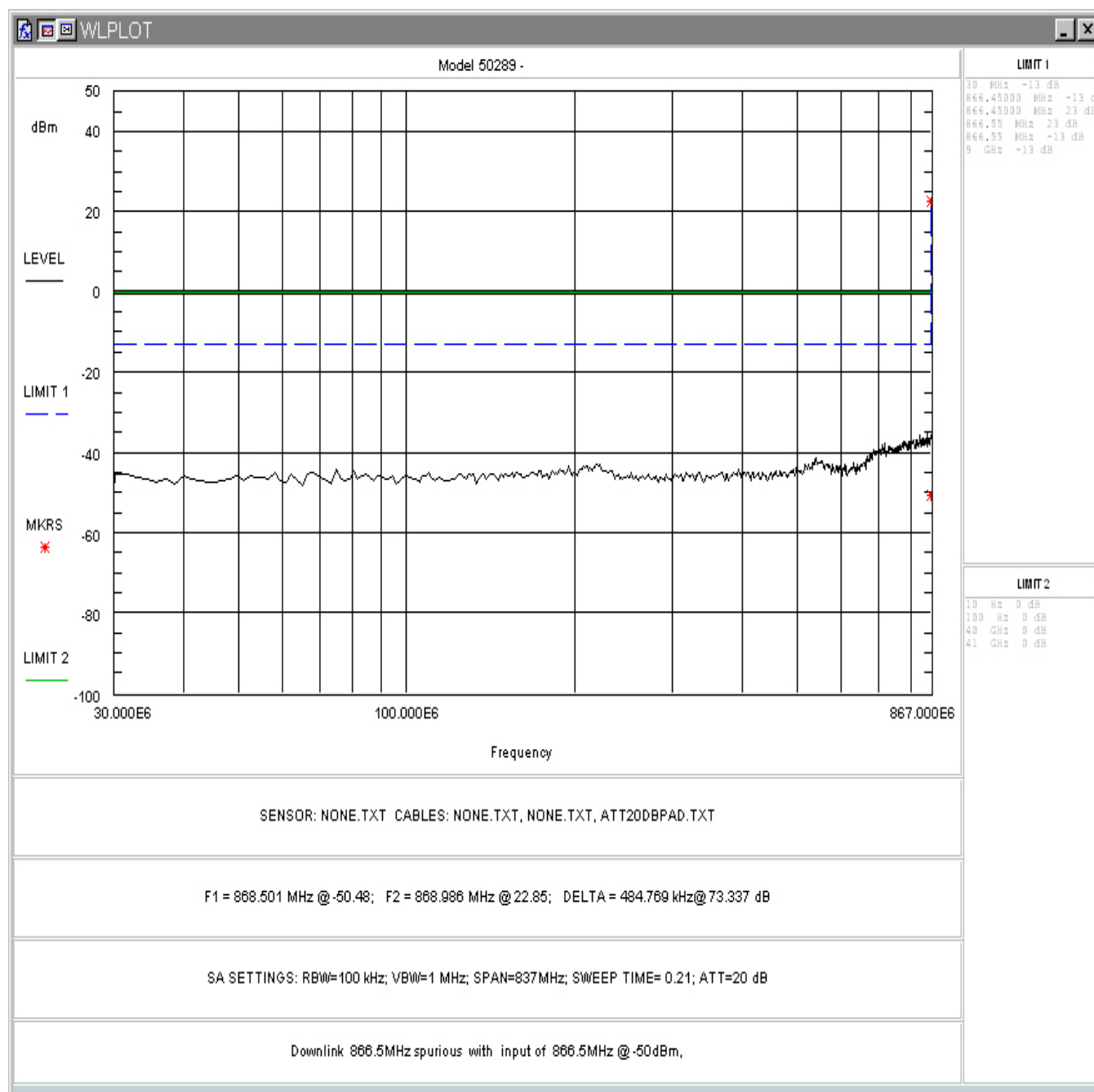


Figure 4-22. Conducted Spurious Emissions, Mid Channel 30 – 867MHz

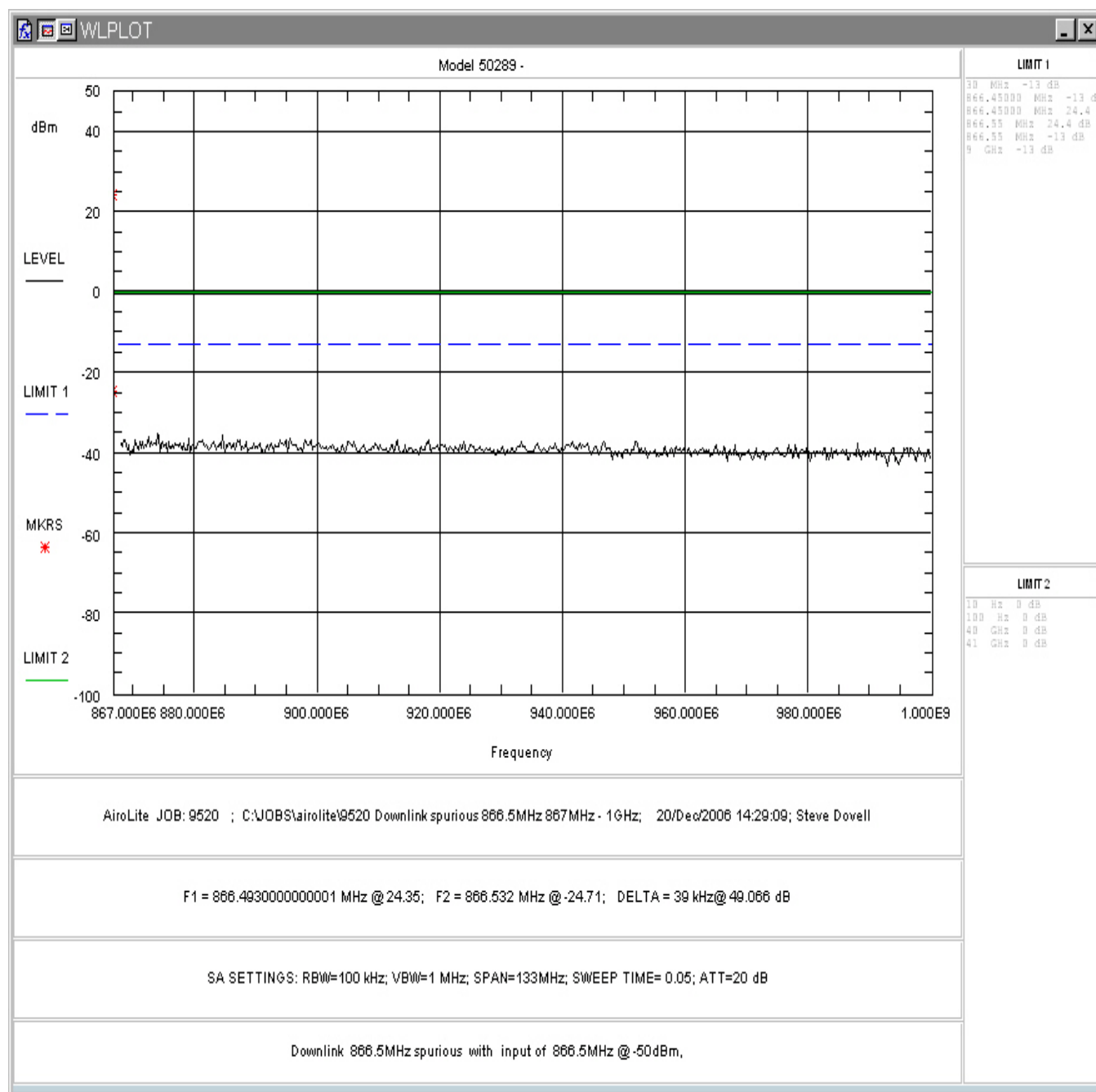


Figure 4-23. Conducted Spurious Emissions, Mid Channel 867 – 1000MHz

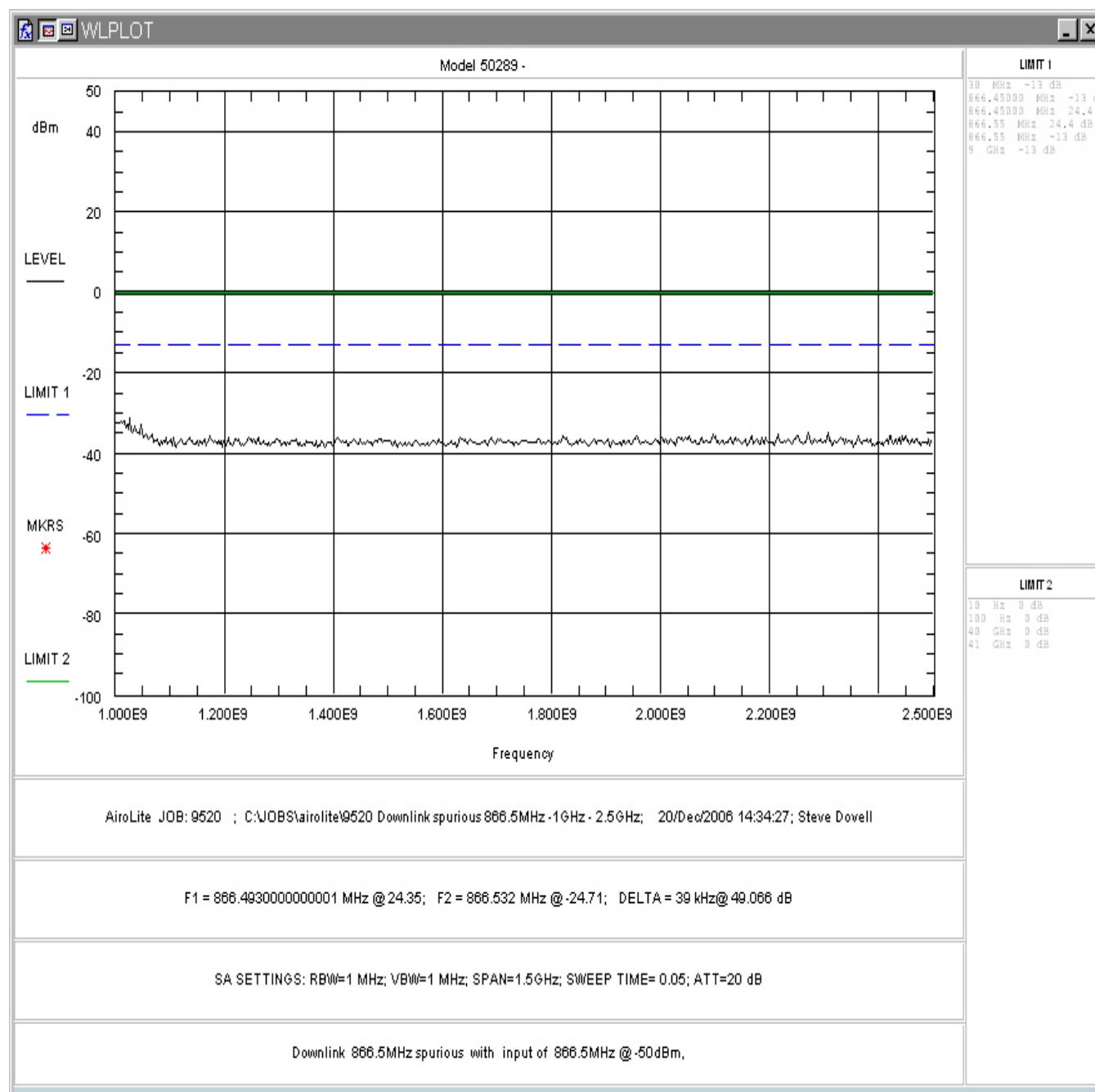


Figure 4-24. Conducted Spurious Emissions, Mid Channel 1 – 2.5GHz

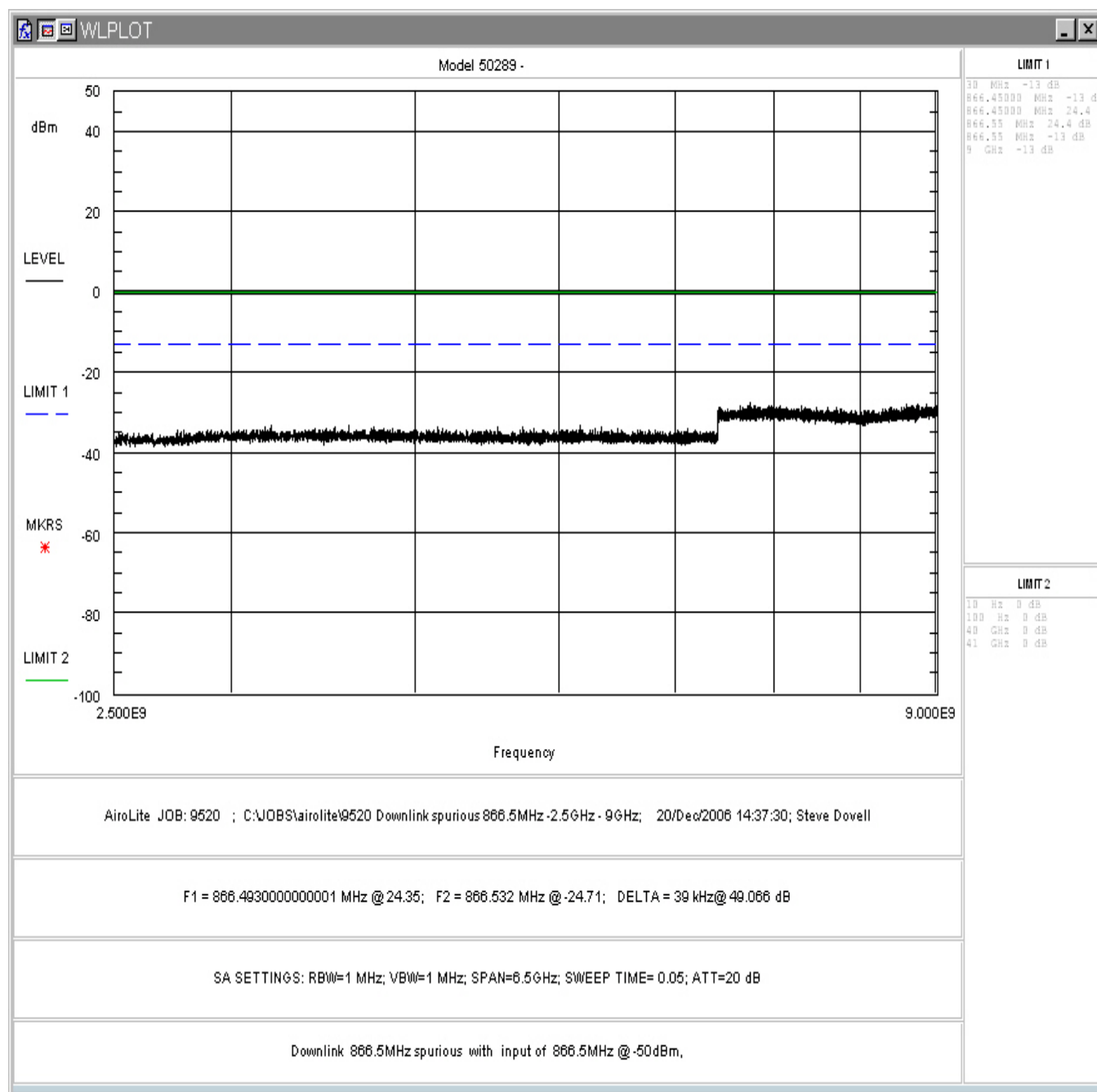


Figure 4-25. Conducted Spurious Emissions, Mid Channel 2.5 – 9GHz

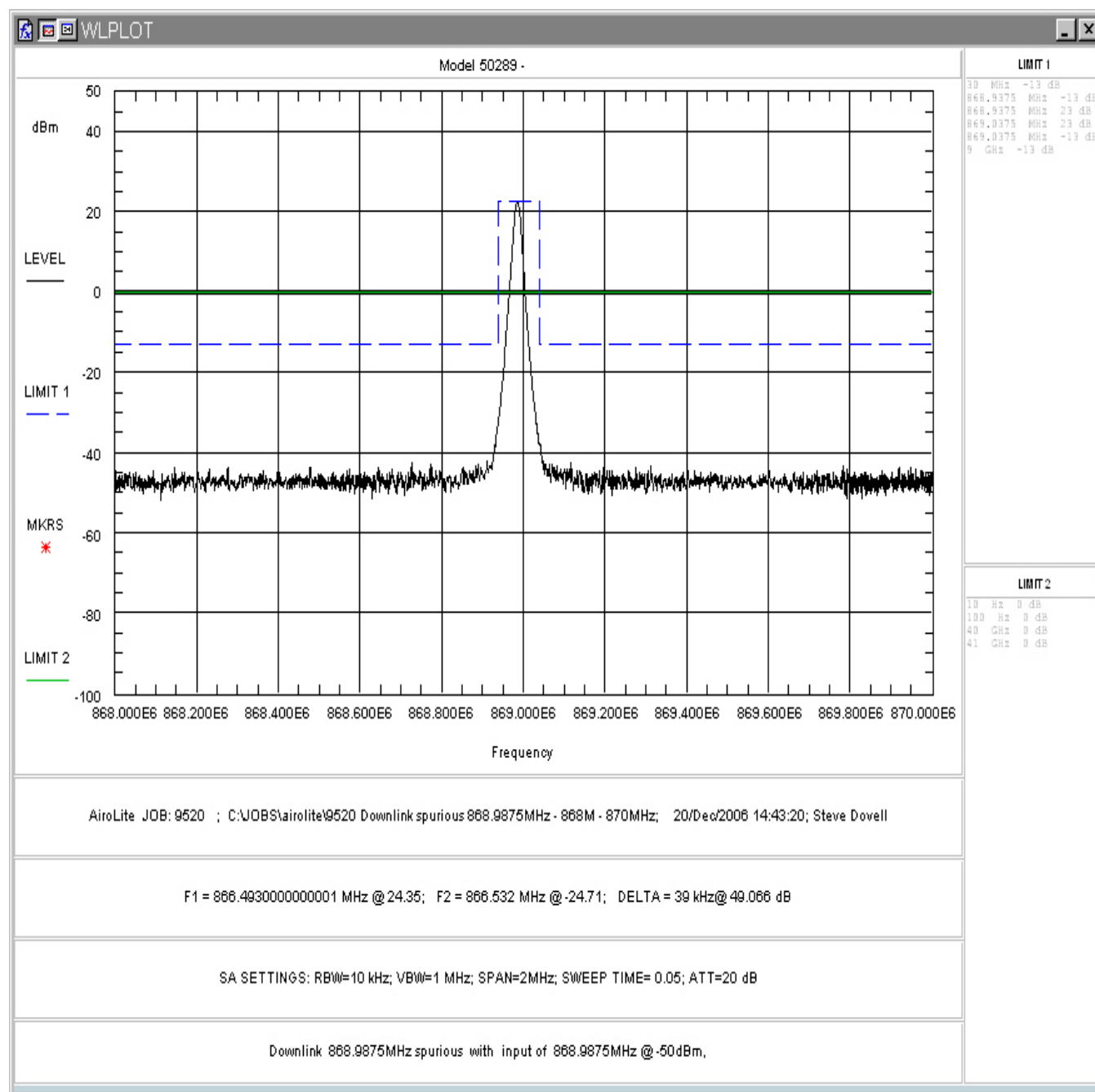


Figure 4-26. Conducted Spurious Emissions, High Channel Inband

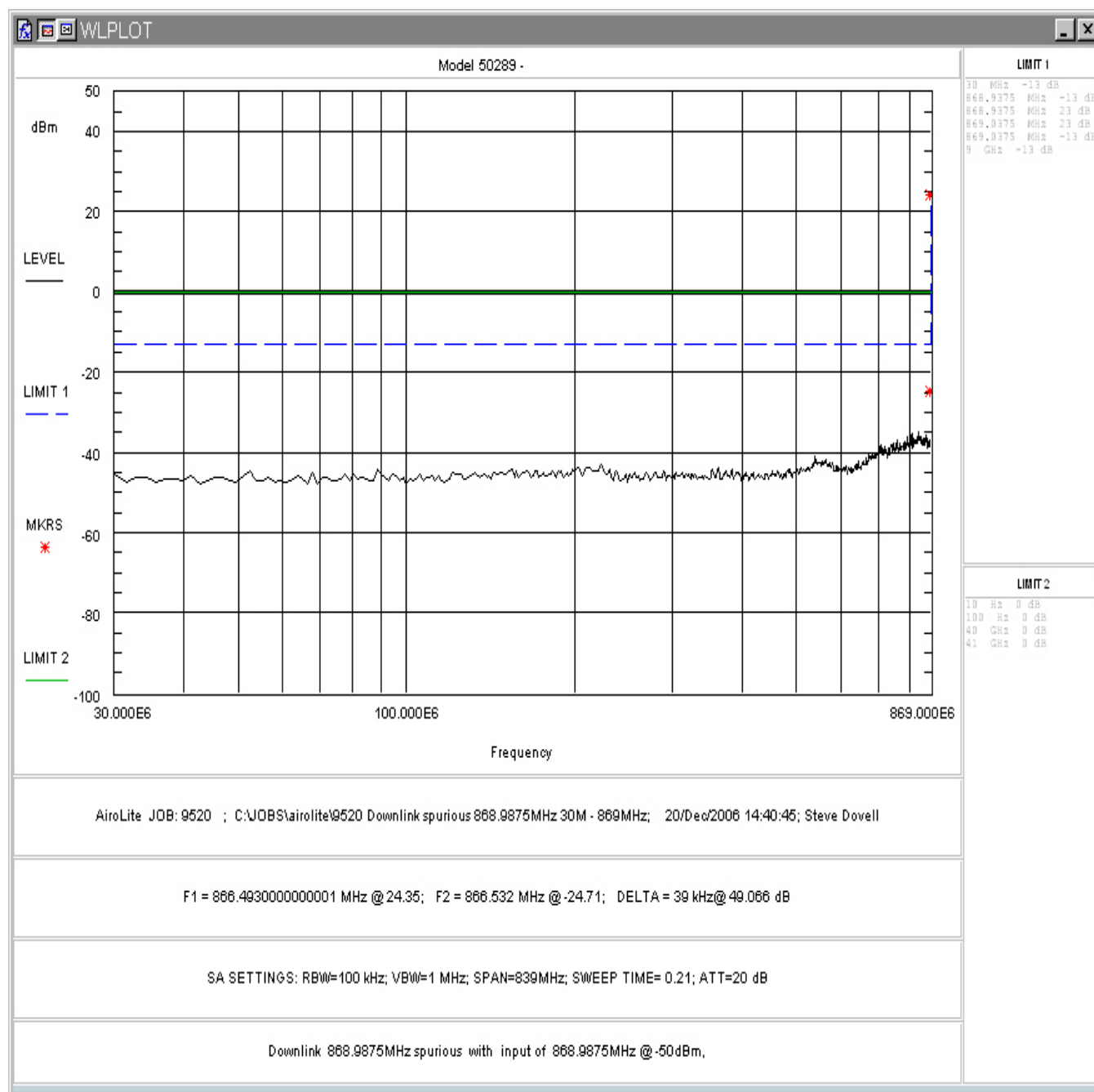


Figure 4-27. Conducted Spurious Emissions, High Channel 30 – 869MHz

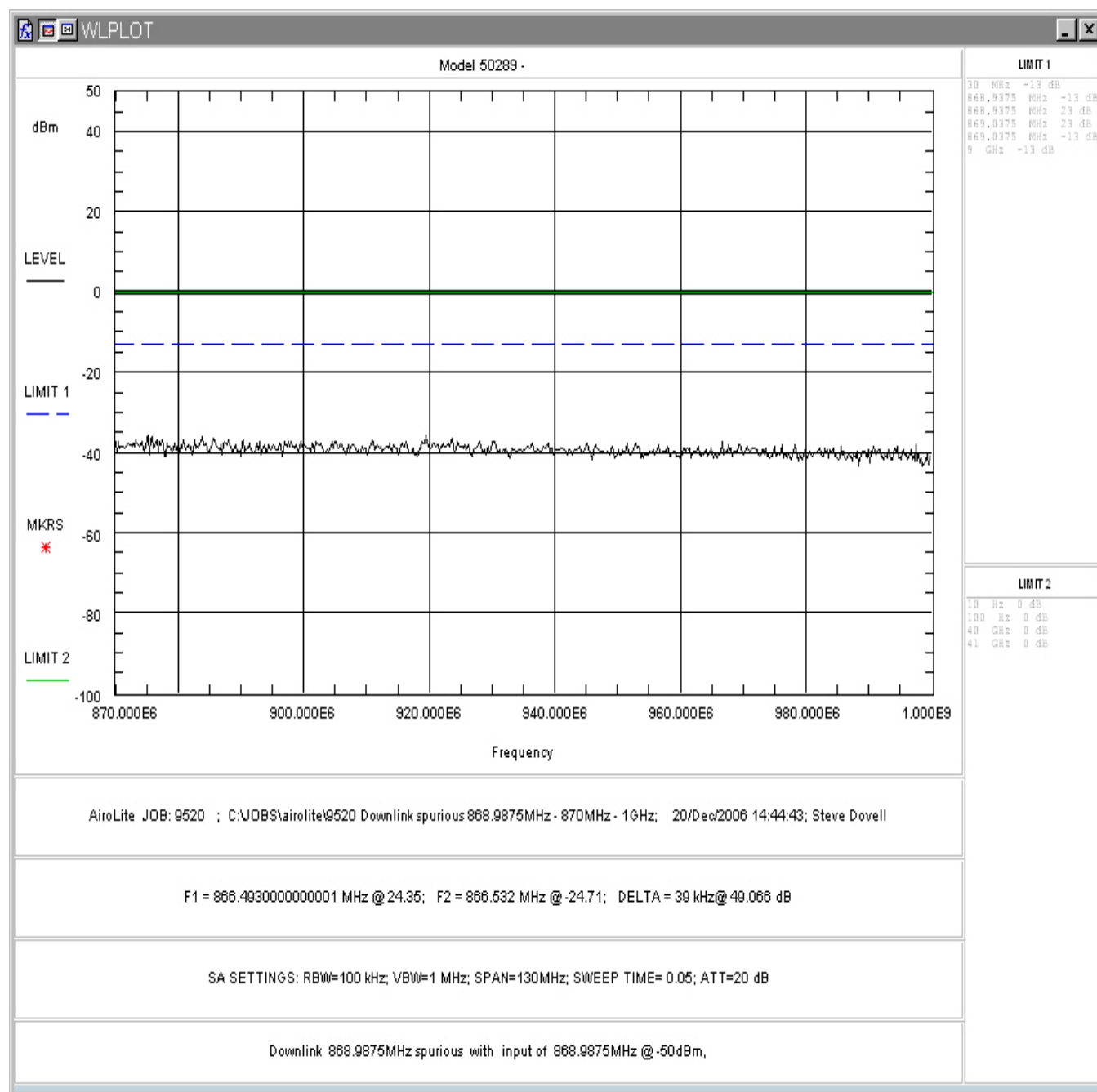


Figure 4-28. Conducted Spurious Emissions, High Channel 870 – 1000MHz

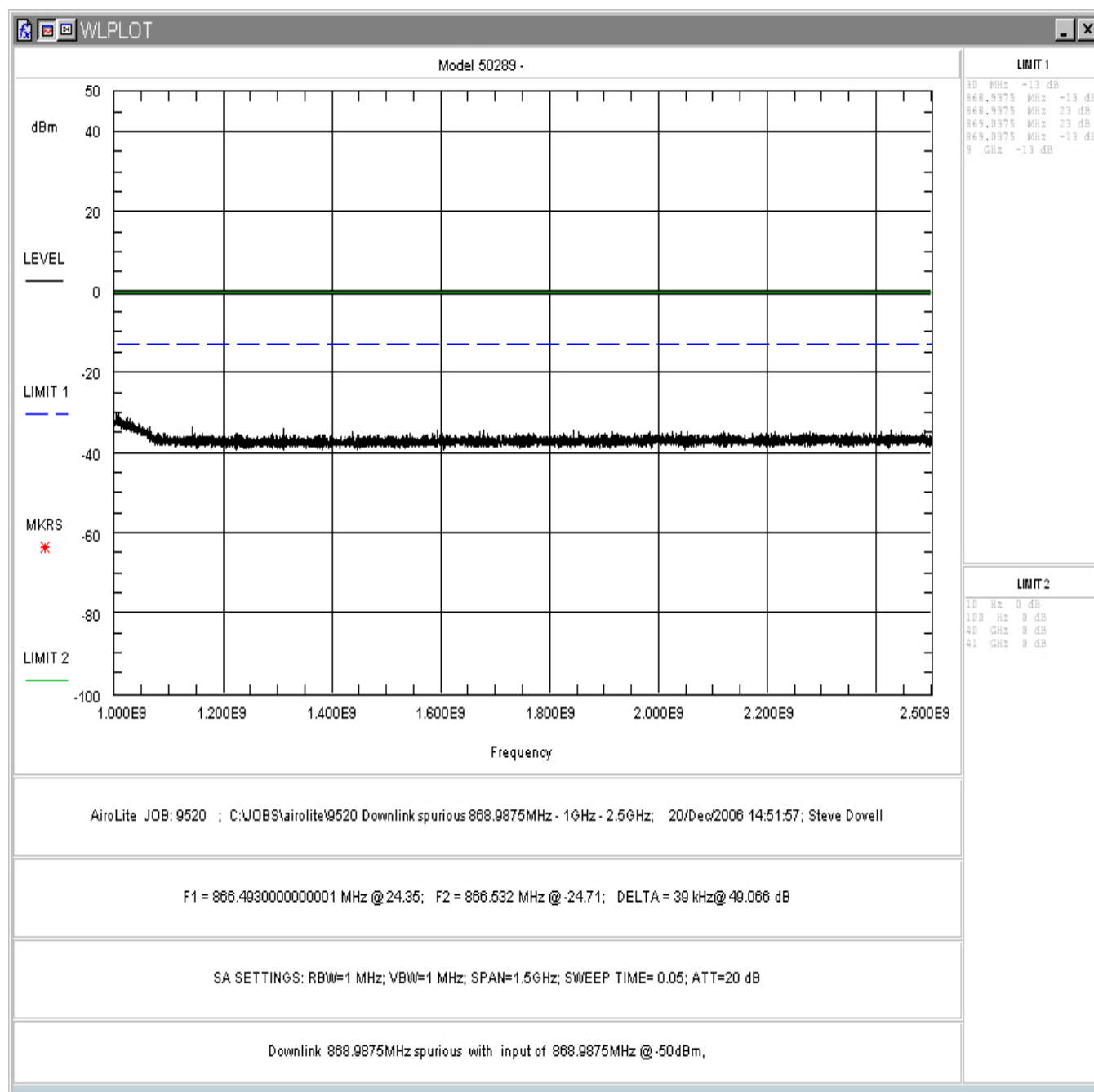


Figure 4-29. Conducted Spurious Emissions, High Channel 1 – 2.5GHz

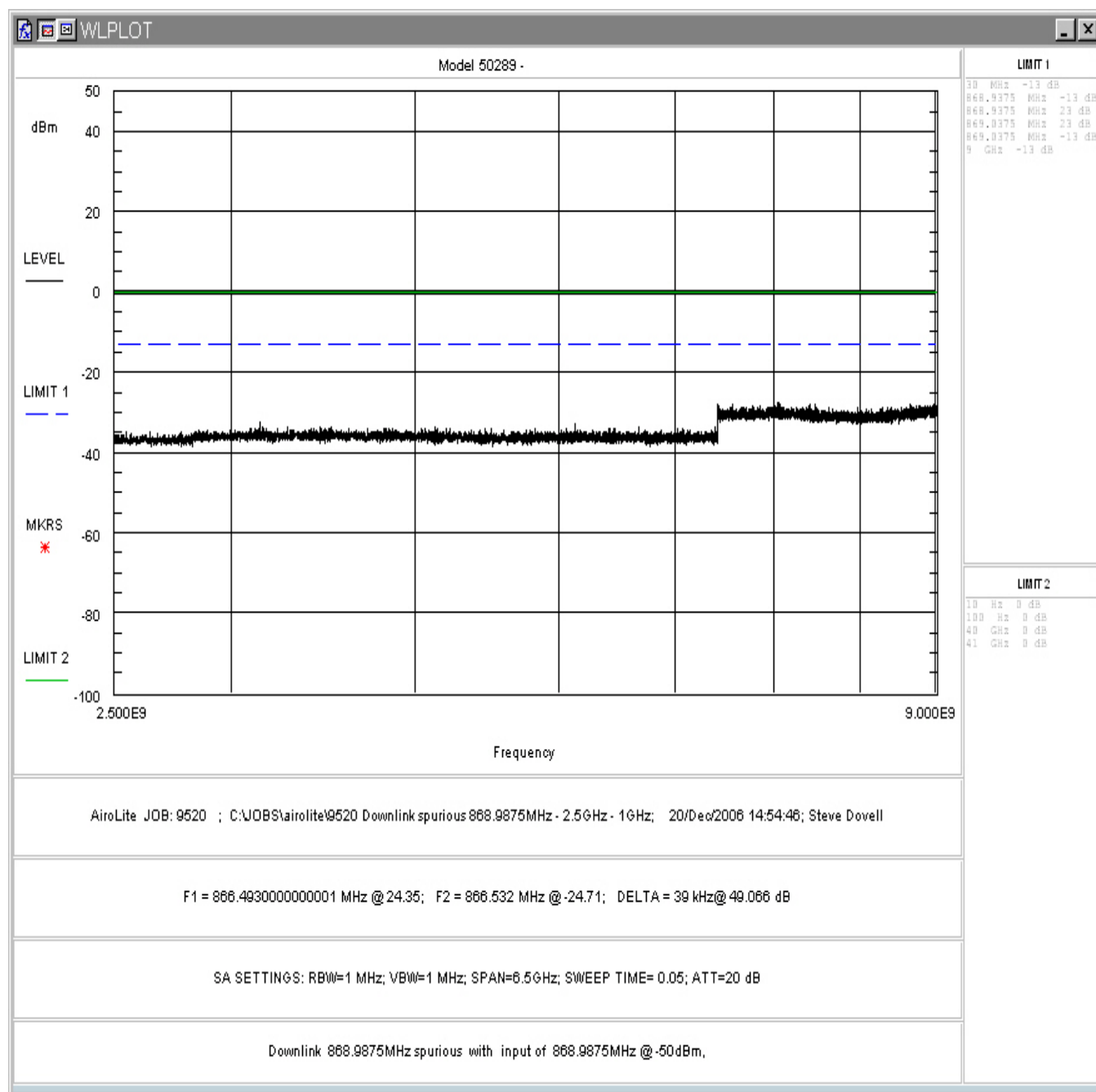


Figure 4-30. Conducted Spurious Emissions, High Channel 2.5 – 9GHz

4.5 Intermodulated Spurious Emissions

Testing for intermodulated spurious emissions was performed using two signal generators, both set at -50dBm. The first signal generator was set at 864.0125MHz with FM Modulation, 4.2kHz deviation, 1kHz tone. The second was set at 868.9875MHz with 4.2kHz deviation and a 2.5kHz tone. Testing was performed from 30M – 8GHz. The data is presented in the charts below.

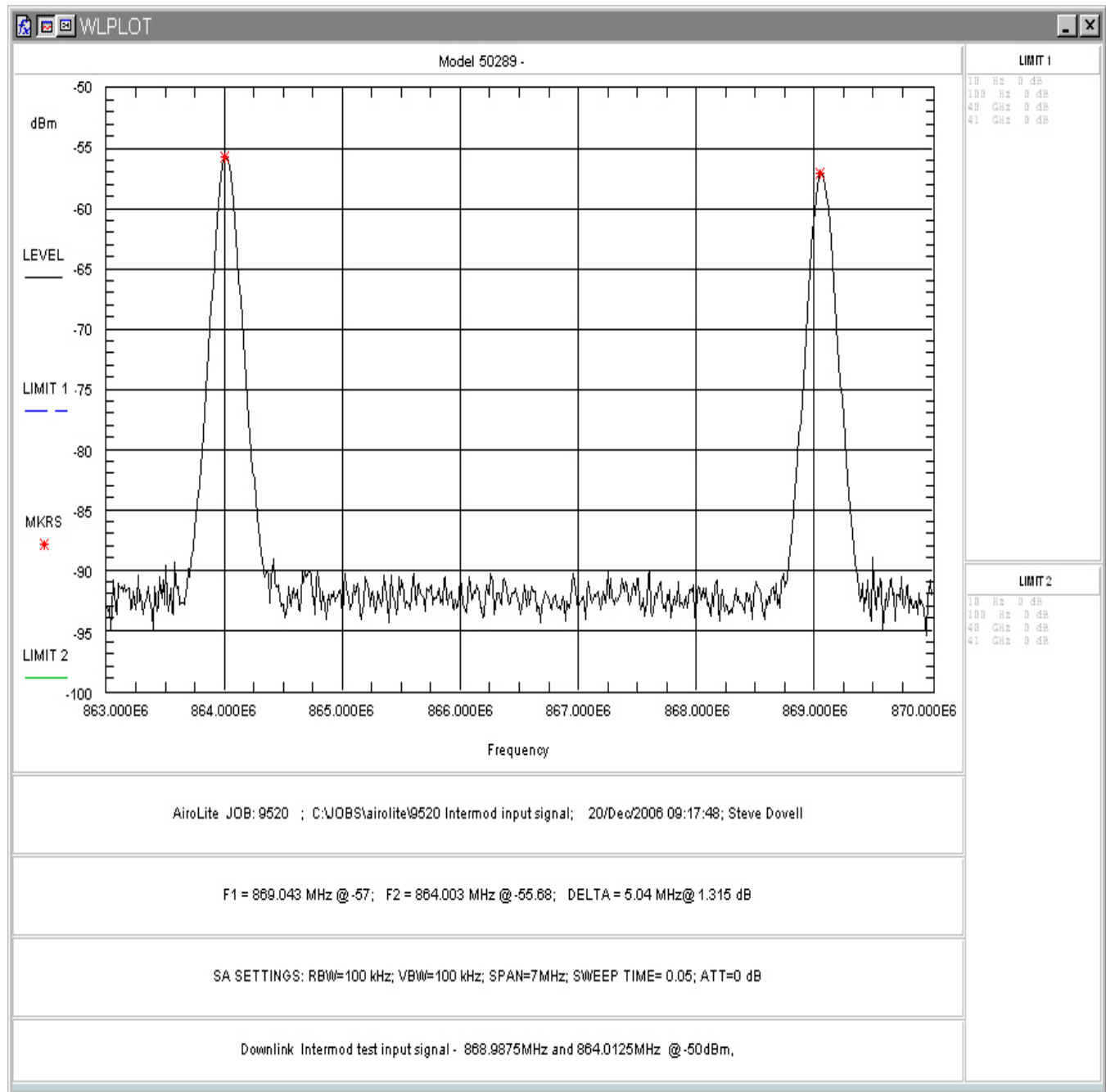


Figure 4-31. Intermodulated Spurious Emissions, In-band, Input

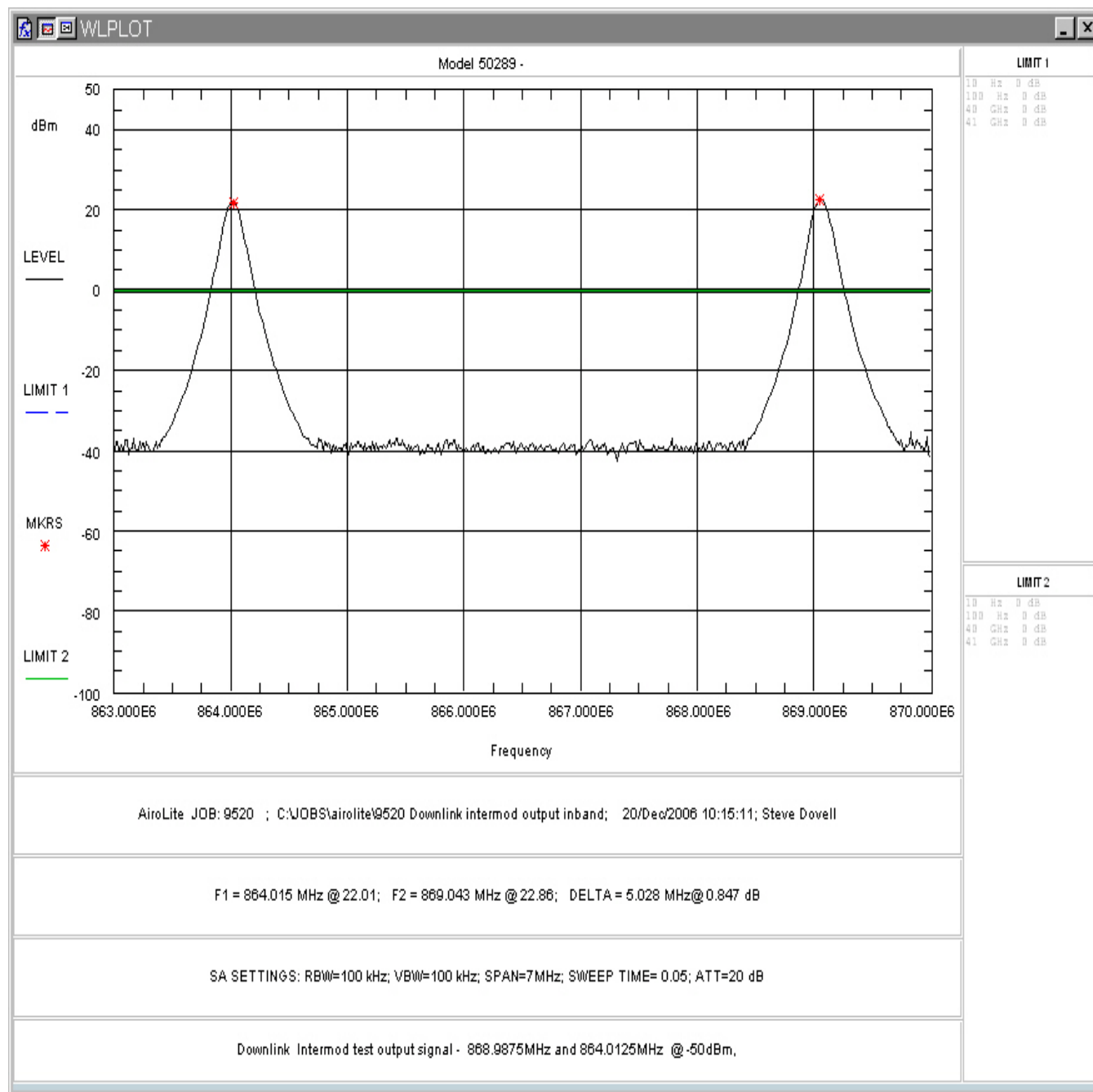


Figure 4-32. Intermodulated Spurious Emissions, In-band, Output

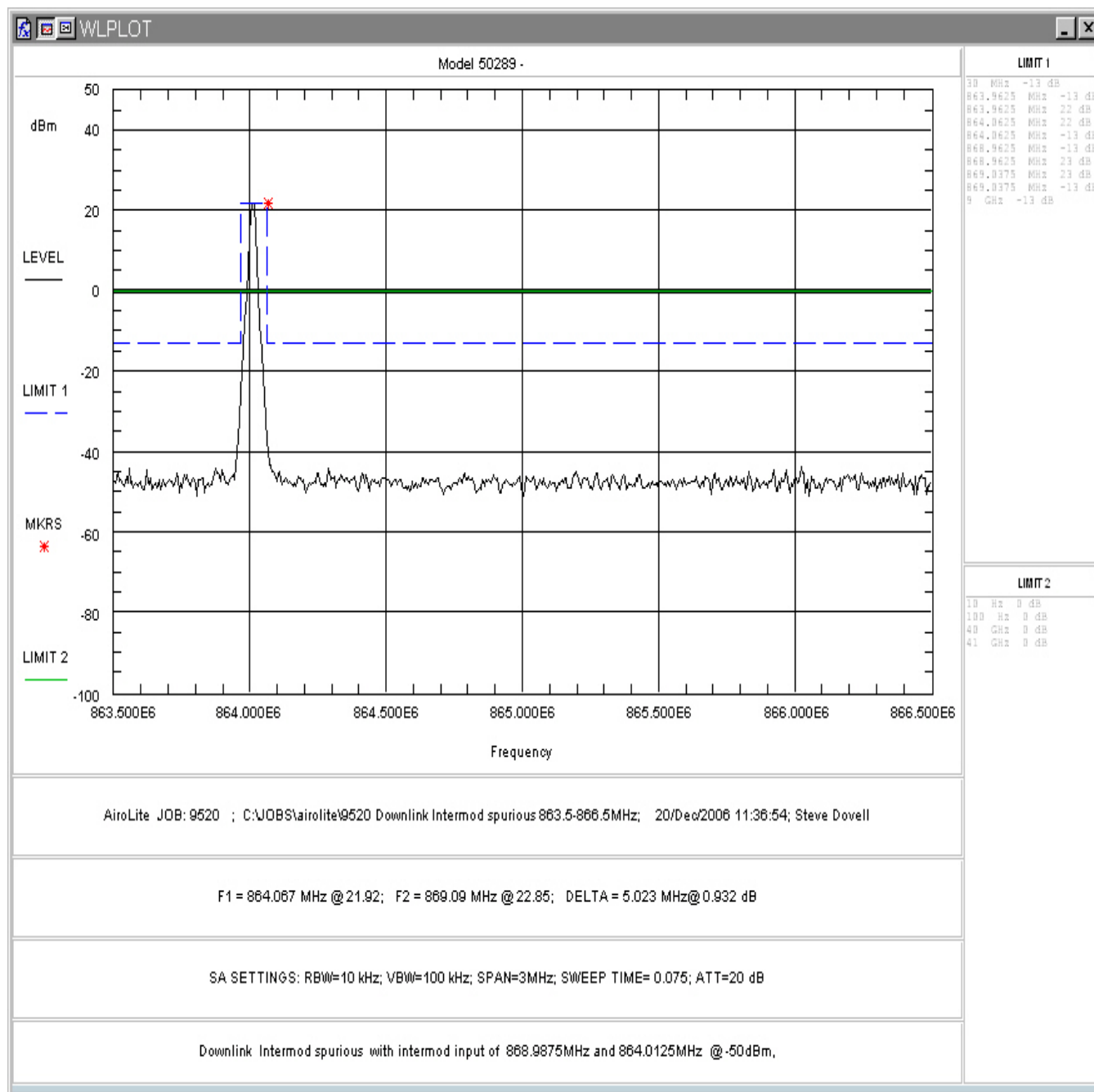


Figure 4-33. Intermodulated Spurious Emissions, In-band, 863.5 – 866.5MHz

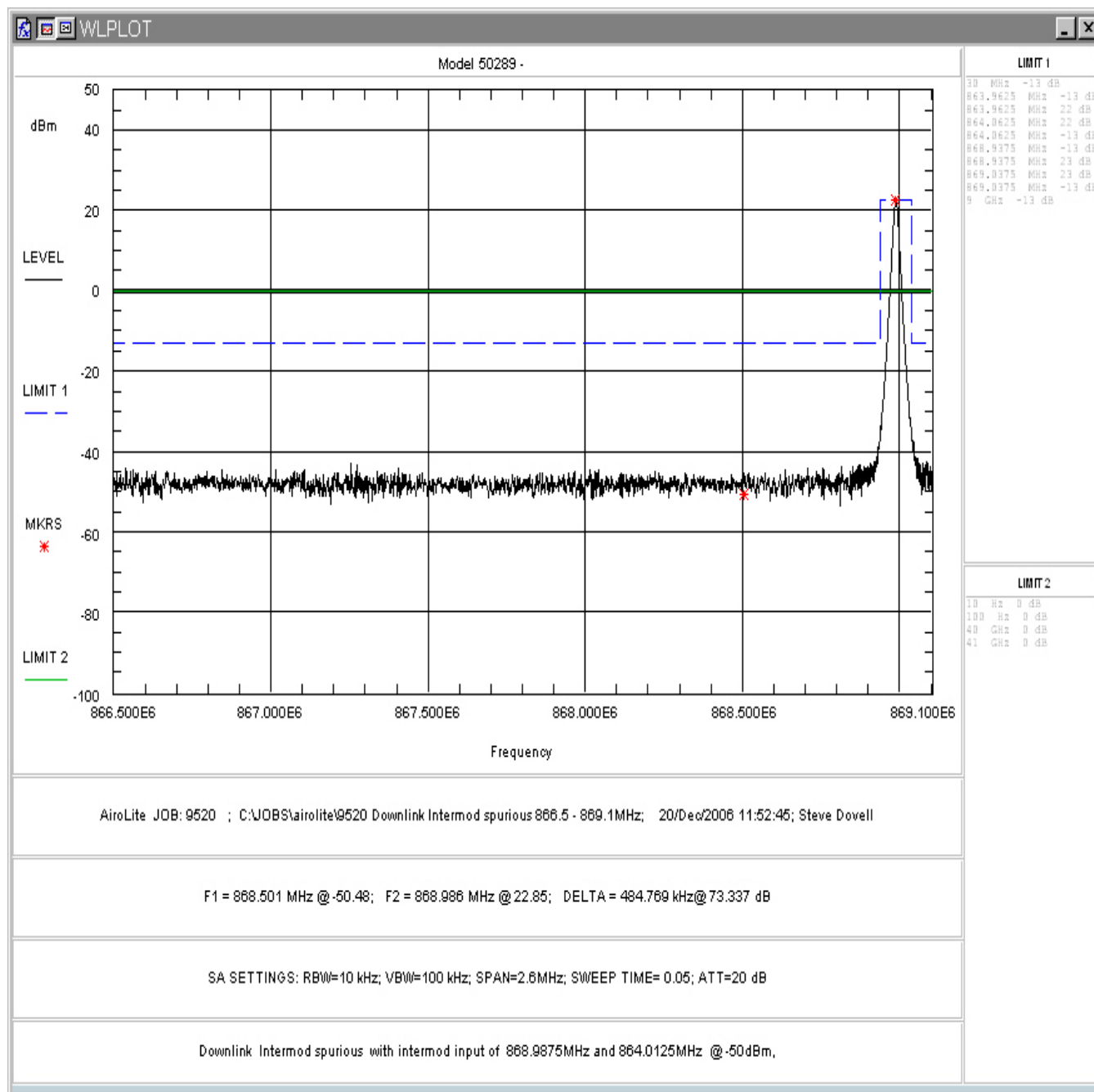


Figure 4-34. Intermodulated Spurious Emissions, In-band, 866.5 – 869.1MHz

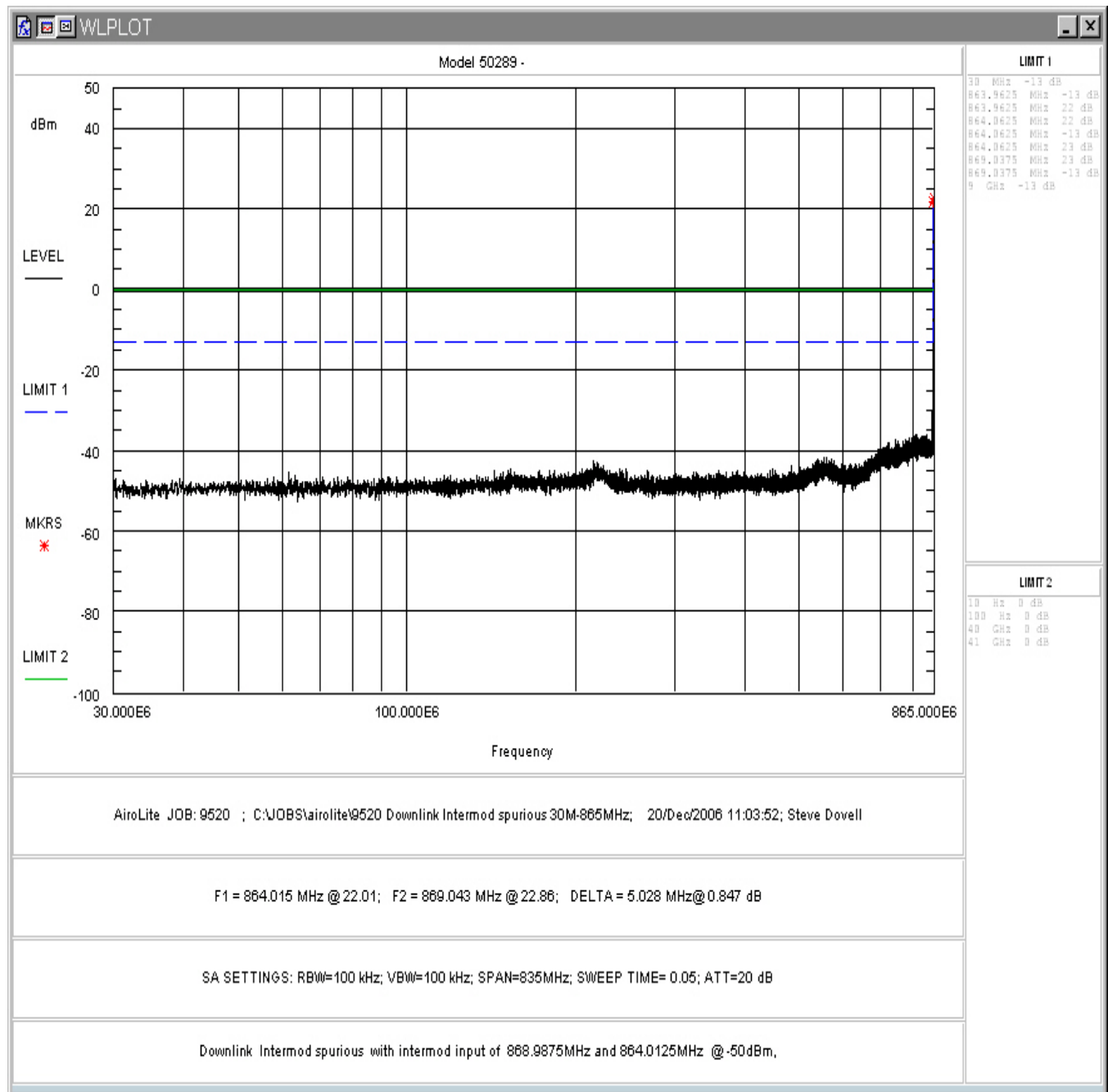


Figure 4-35. Intermodulated Spurious Emissions, 30 – 865MHz

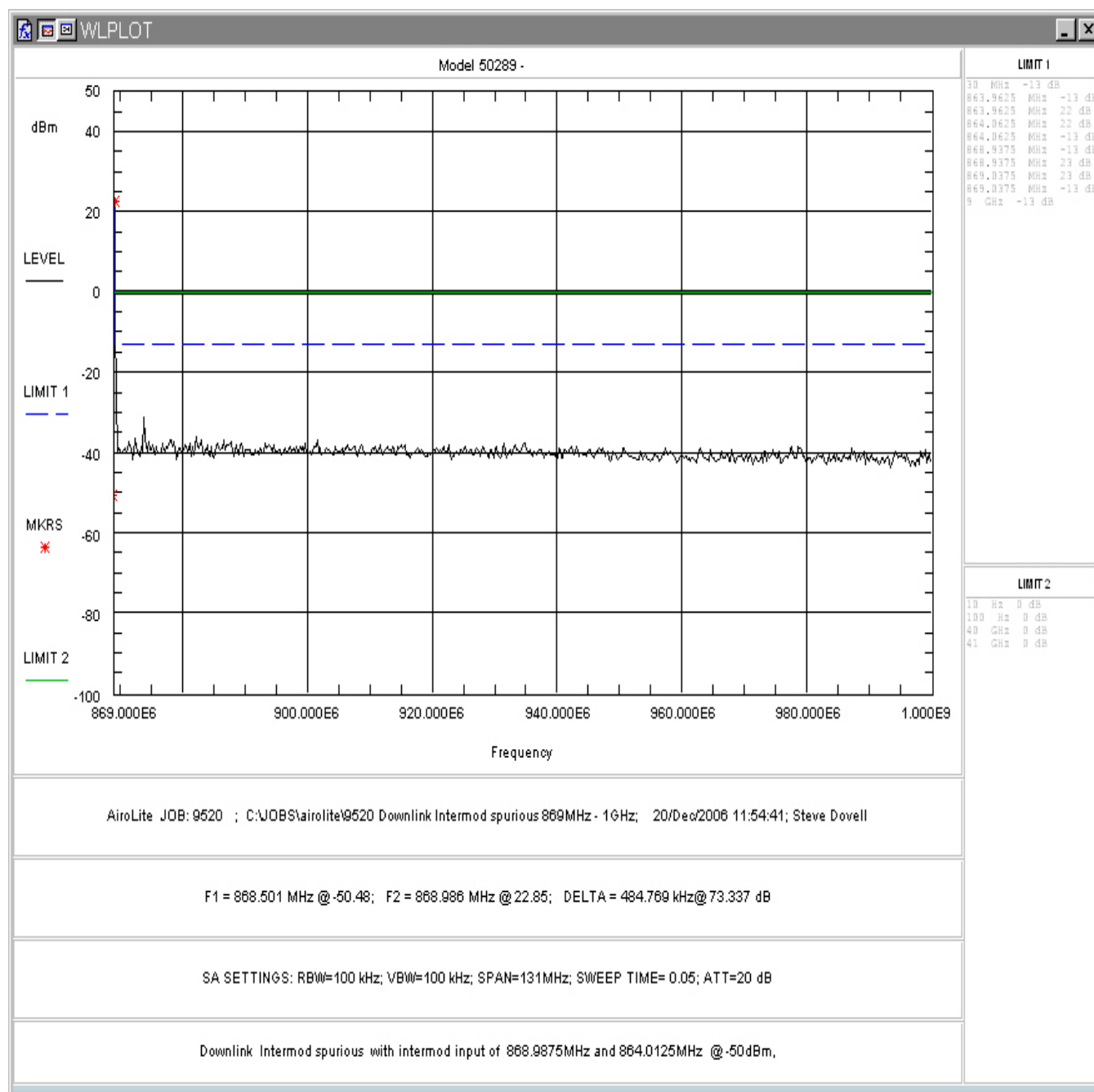


Figure 4-36. Intermodulated Spurious Emissions, 869 – 1000MHz

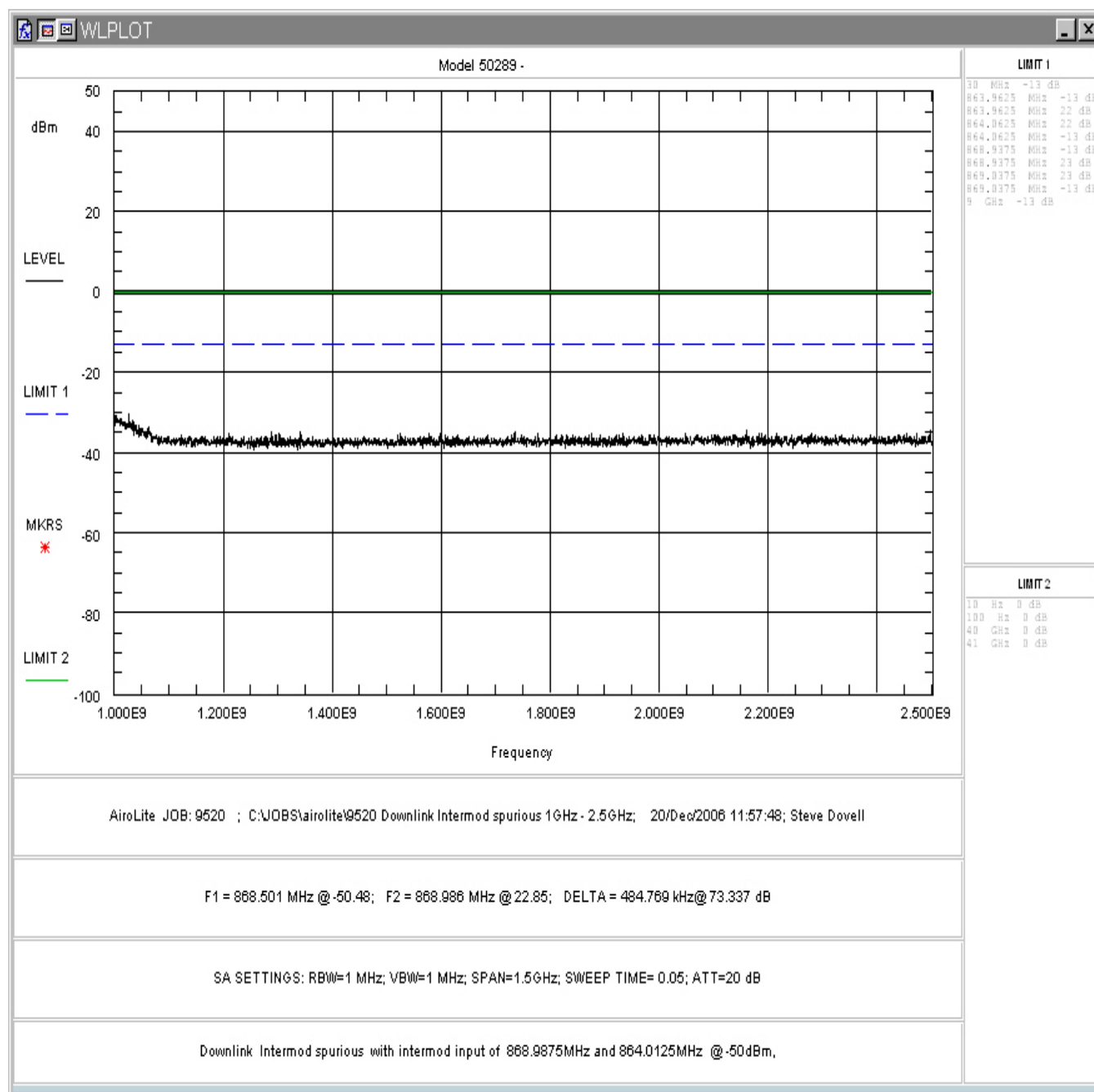


Figure 4-37. Intermodulated Spurious Emissions, 1 – 2.5GHz

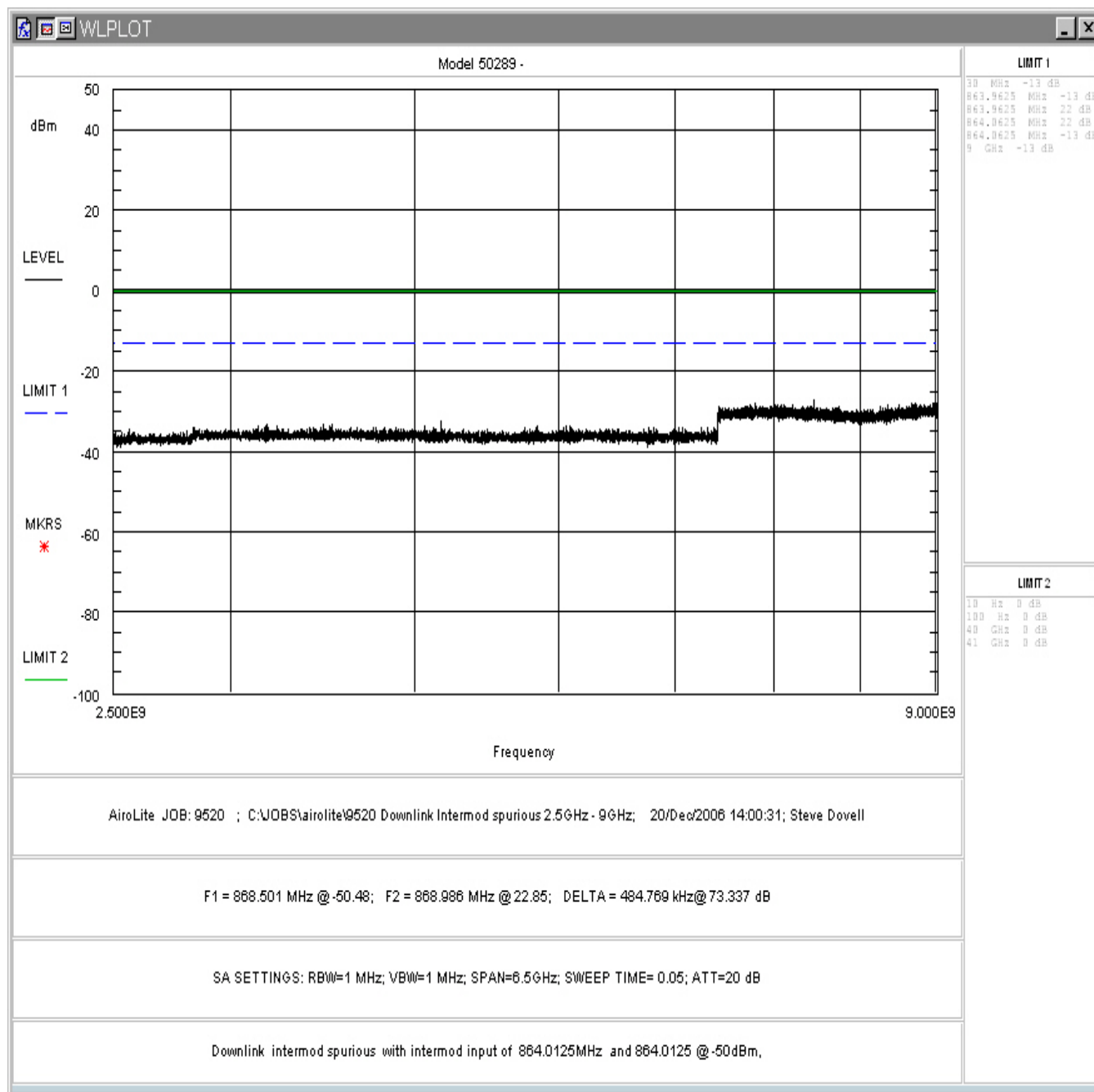


Figure 4-38. Intermodulated Spurious Emissions, 2.5 – 9GHz

4.6 Radiated Spurious Emissions: (FCC Part §2.1053)

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands. These emissions must meet the limits specified in §15.209 and §15.35(b) for peak measurements.

4.6.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output was terminated in 50ohms and the radiated spurious emissions measured.

Table 6: Radiated Emission Frequency Data

Low	Mid	High
864.013	866.500	868.988
1728.025	1733.000	1737.975
2592.038	2599.500	2606.963
3456.050	3466.000	3475.950
4320.063	4332.500	4344.938
5184.075	5199.000	5213.925
6048.088	6065.500	6082.913
6912.100	6932.000	6951.900
7776.113	7798.500	7820.888
8640.125	8665.000	8689.875

Table 7: Radiated Emission Test Data, Low Channel

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	Spurious Level dBµV	Sub. Sig. Gen. Level dBm	Sub. Power Level dBm	Sub. Ant. Factor dB/m	Sub. Ant. Gain dBi	EIRP Level dBm	Limit dBm	Margin dB
864.02	V	180.0	1.0	26.3	-44.2	-56.4	22.4	6.5	-49.9	-13.0	-36.9
1728.025	V	0.0	1.0	48.6	-60.0	-70.0	29.1	5.8	-64.2	-13.0	-51.2
2592.038	V	0.0	1.0	38.4	-68.1	-76.9	33.6	4.9	-72.0	-13.0	-59.0
3456.050	V	0.0	1.0	40.3	-66.1	-76.1	34.6	6.4	-69.7	-13.0	-56.7
4320.063	V	0.0	1.0	39.4	-60.0	-71.9	36.1	6.8	-65.1	-13.0	-52.1
5184.075	V	0.0	1.0	39.7	-54.1	-69.1	37.0	7.5	-61.6	-13.0	-48.6
6048.088	V	0.0	1.0	39.1	-53.8	-69.4	38.5	7.3	-62.1	-13.0	-49.1
6912.100	V	0.0	1.0	44.2	-41.1	-60.6	39.9	7.1	-53.5	-13.0	-40.5
7776.113	V	0.0	1.0	47.3	-30.1	-52.7	41.5	6.5	-46.2	-13.0	-33.2
8640.125	V	0.0	1.0	45.6	-21.1	-50.4	43.1	5.8	-44.6	-13.0	-31.6
864.020	H	180.0	1.0	23.9	-45.4	-57.4	22.4	6.5	-50.9	-13.0	-37.9
1728.025	H	0.0	1.0	44.6	-66.2	-75.1	29.1	5.8	-69.3	-13.0	-56.3
2592.038	H	0.0	1.0	40.1	-67.1	-75.1	33.6	4.9	-70.2	-13.0	-57.2
3456.050	H	0.0	1.0	40.4	-63.9	-73.9	34.6	6.4	-67.5	-13.0	-54.5
4320.063	H	0.0	1.0	40.0	-58.8	-70.6	36.1	6.8	-63.8	-13.0	-50.8
5184.075	H	0.0	1.0	40.6	-53.6	-68.7	37.0	7.5	-61.2	-13.0	-48.2
6048.088	H	0.0	1.0	40.5	-48.6	-65.1	38.5	7.3	-57.8	-13.0	-44.8
6912.100	H	0.0	1.0	45.4	-38.4	-58.6	39.9	7.1	-51.5	-13.0	-38.5
7776.113	H	0.0	1.0	47.5	-31.1	-53.7	41.5	6.5	-47.2	-13.0	-34.2
8640.125	H	0.0	1.0	46.5	-19.4	-48.7	43.1	5.8	-42.9	-13.0	-29.9

Table 8: Radiated Emission Test Data, Mid Channel

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	Spurious Level dBμV	Sub. Sig. Gen. Level dBm	Sub. Power Level dBm	Sub. Ant. Factor dB/m	Sub. Ant. Gain dBi	EIRP Level dBm	Limit dBm	Margin dB
866.500	V	225.0	1.0	16.3	-52.0	-64.8	22.5	6.5	-58.3	-13.0	-45.3
1733.000	V	0.0	1.0	43.5	-74.4	-80.9	29.2	5.8	-75.1	-13.0	-62.1
2599.500	V	0.0	1.0	39.4	-67.9	-76.4	33.6	4.9	-71.5	-13.0	-58.5
3466.000	V	0.0	1.0	39.5	-65.4	-75.1	34.6	6.4	-68.7	-13.0	-55.7
4332.500	V	0.0	1.0	39.1	-60.6	-72.3	36.1	6.8	-65.5	-13.0	-52.5
5199.000	V	0.0	1.0	38.8	-55.1	-70.3	37.0	7.5	-62.8	-13.0	-49.8
6065.500	V	0.0	1.0	39.4	-48.9	-65.3	38.6	7.3	-58.0	-13.0	-45.0
6932.000	V	0.0	1.0	44.5	-38.8	-58.5	39.9	7.1	-51.4	-13.0	-38.4
7798.500	V	0.0	1.0	46.1	-28.3	-50.9	41.6	6.4	-44.5	-13.0	-31.5
8665.000	V	0.0	1.0	45.3	-17.7	-46.4	43.2	5.8	-40.6	-13.0	-27.6
866.500	H	41.0	1.0	13.0	-55.0	-67.3	22.5	6.5	-60.8	-13.0	-47.8
1733.000	H	0.0	1.0	38.8	-75.3	-81.9	29.2	5.8	-76.1	-13.0	-63.1
2599.500	H	0.0	1.0	37.8	-63.9	-72.9	33.6	4.9	-68.0	-13.0	-55.0
3466.000	H	0.0	1.0	40.1	-61.2	-71.9	34.6	6.4	-65.5	-13.0	-52.5
4332.500	H	0.0	1.0	39.4	-57.6	-70.1	36.1	6.8	-63.3	-13.0	-50.3
5199.000	H	0.0	1.0	38.9	-56.6	-71.8	37.0	7.5	-64.3	-13.0	-51.3
6065.500	H	0.0	1.0	39.0	-49.4	-65.8	38.6	7.3	-58.5	-13.0	-45.5
6932.000	H	0.0	1.0	43.9	-38.0	-57.7	39.9	7.1	-50.6	-13.0	-37.6
7798.500	H	0.0	1.0	45.8	-30.4	-53.4	41.6	6.4	-47.0	-13.0	-34.0
8665.000	H	0.0	1.0	44.3	-18.4	-47.4	43.2	5.8	-41.6	-13.0	-28.6

Table 9: Radiated Emission Test Data, High Channel

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	Spurious Level dBμV	Sub. Sig. Gen. Level dBm	Sub. Power Level dBm	Sub. Ant. Factor dB/m	Sub. Ant. Gain dBi	EIRP Level dBm	Limit dBm	Margin dB
868.988	V	128.0	1.0	9.8	-58.1	-70.7	22.5	6.5	-64.2	-13.0	-51.2
1737.975	V	0.0	1.0	44.3	-65.2	-74.1	29.2	5.8	-68.3	-13.0	-55.3
2606.963	V	0.0	1.0	38.8	-65.8	-74.7	33.7	4.8	-69.9	-13.0	-56.9
3475.950	V	0.0	1.0	39.4	-63.8	-74.9	34.6	6.5	-68.4	-13.0	-55.4
4344.938	V	0.0	1.0	40.0	-61.1	-72.2	36.1	6.9	-65.3	-13.0	-52.3
5213.925	V	0.0	1.0	42.7	-52.7	-66.9	37.1	7.5	-59.4	-13.0	-46.4
6082.913	V	0.0	1.0	39.5	-49.4	-66.3	38.6	7.3	-59.0	-13.0	-46.0
6951.900	V	0.0	1.0	43.2	-39.1	-58.5	40.0	7.1	-51.4	-13.0	-38.4
7820.888	V	0.0	1.0	44.3	-30.9	-54.0	41.7	6.4	-47.6	-13.0	-34.6
8689.875	V	0.0	1.0	44.2	-17.3	-45.9	43.3	5.7	-40.2	-13.0	-27.2
868.988	H	100.0	1.0	15.6	-51.9	-65.1	22.5	6.5	-58.6	-13.0	-45.6
1737.975	H	0.0	1.0	46.0	-65.4	-74.3	29.2	5.8	-68.5	-13.0	-55.5
2606.963	H	0.0	1.0	38.7	-64.6	-73.5	33.7	4.8	-68.7	-13.0	-55.7
3475.950	H	0.0	1.0	39.7	-64.1	-75.2	34.6	6.5	-68.7	-13.0	-55.7
4344.938	H	0.0	1.0	41.4	-59.2	-71.9	36.1	6.9	-65.0	-13.0	-52.0
5213.925	H	0.0	1.0	35.5	-55.0	-69.2	37.1	7.5	-61.7	-13.0	-48.7
6082.913	H	0.0	1.0	38.7	-47.3	-64.2	38.6	7.3	-56.9	-13.0	-43.9
6951.900	H	0.0	1.0	44.2	-37.7	-57.3	40.0	7.1	-50.2	-13.0	-37.2
7820.888	H	0.0	1.0	46.7	-28.2	-51.4	41.7	6.4	-45.0	-13.0	-32.0
8689.875	H	0.0	1.0	45.7	-19.4	-47.9	43.3	5.7	-42.2	-13.0	-29.2

4.7 Conducted Emissions

4.7.1 Requirements

Compliance Limits		
Frequency	Quasi-peak	Average
0.15-0.5MHz	66 to 56dB μ V	56 to 46dB μ V
0.5 to 5MHz	56dB μ V	46dB μ V
0.5-30MHz	60dB μ V	50dB μ V

4.7.2 Test Procedure

The EUT was placed on an 80 cm high 1 X 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω /50 μ H Line Impedance Stabilization Network bonded to a 3 X 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power was supplied to the peripherals through a second LISN. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak, peak, or average as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth. For average measurements the post-detector filter was set to 10 Hz.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed. The Conducted emissions level to be compared to the FCC limit is calculated as shown in the following example.

Example:

Spectrum Analyzer Voltage: VdB μ V

LISN Correction Factor: LISN dB

Cable Correction Factor: CF dB

Electric Field: EdB μ V = V dB μ V + LISN dB + CF dB

4.7.3 Test Data

Table 6 provides the test results for power line conducted emissions.

Table 10: Conducted Emission Test Data

864.0125MHz/-50dBm

LINE 1 - NEUTRAL

Frequency (MHz)	Level QP (dBμV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBμV)	Level Corr (dBμV)	Margin QP (dB)	Level AVG (dBμV)	Cable Loss (dB)	Level Corr (dBμV)	Limit AVG (dBμV)	Margin AVG (dB)
0.198	39.6	10.2	-1.7	79.0	48.1	-30.9	25.6	10.2	34.1	66.0	-31.9
3.206	52.0	10.6	-8.5	73.0	54.1	-18.9	50.5	10.6	52.6	60.0	-7.4
7.829	61.8	11.1	-10.7	73.0	62.2	-10.8	29.6	11.1	30.0	60.0	-30.0
8.162	58.8	11.1	-10.8	73.0	59.1	-13.9	29.0	11.1	29.3	60.0	-30.7
9.842	54.6	11.2	-11.2	73.0	54.6	-18.4	37.4	11.2	37.4	60.0	-22.6
10.168	53.7	11.2	-11.3	73.0	53.6	-19.4	36.4	11.2	36.3	60.0	-23.7
12.716	54.1	11.4	-11.9	73.0	53.6	-19.4	35.8	11.4	35.3	60.0	-24.7
14.188	49.2	11.5	-12.1	73.0	48.6	-24.4	30.8	11.5	30.2	60.0	-29.8

LINE 2 - PHASE

Frequency (MHz)	Level QP (dBμV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBμV)	Level Corr (dBμV)	Margin QP (dB)	Level AVG (dBμV)	Cable Loss (dB)	Level Corr (dBμV)	Limit AVG (dBμV)	Margin AVG (dB)
0.197	37.6	10.2	-2.0	79.0	45.8	-33.2	25.8	10.2	34.0	66.0	-32.0
3.209	44.8	10.6	-8.8	73.0	46.6	-26.4	44.2	10.6	46.0	60.0	-14.0
7.637	60.6	11.1	-10.9	73.0	60.7	-12.3	34.5	11.1	34.6	60.0	-25.4
7.970	59.0	11.1	-11.0	73.0	59.0	-14.0	35.4	11.1	35.4	60.0	-24.6
9.838	52.8	11.2	-11.5	73.0	52.5	-20.5	35.5	11.2	35.2	60.0	-24.8
10.116	53.0	11.2	-11.6	73.0	52.6	-20.4	36.6	11.2	36.2	60.0	-23.8
12.646	54.8	11.4	-12.1	73.0	54.0	-19.0	37.7	11.4	36.9	60.0	-23.1
13.921	54.0	11.5	-12.4	73.0	53.1	-19.9	38.0	11.5	37.1	60.0	-22.9

4.8 Frequency Stability: (FCC Part §2.1055)

Frequency as a function of temperature and voltage variation shall be maintained within the FCC-prescribed tolerances.

There are no frequency-determining elements in the EUT. Hence, Frequency stability is not required.